

AgriTech Startups: A key driver of the agricultural transformation in developing countries

Insights from the Nigerian experience

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Abstract

Within the framework of exploring leading experiences in the field of AgriTech, this research paper serves as an analytical study of the reality of AgriTech in Nigeria. The choice of this country as a case study stems from the fact that it represents a rich and instructive experience from which other developing countries can benefit. The study aims to examine the main technologies and innovations adopted in the field of AgriTech, as well as to identify the key obstacles that hinder the growth and development of the agricultural sector in the country.

The paper adopts a descriptive and analytical approach, relying on empirical data and indicators derived from the Nigerian experience. Particular emphasis is placed on AgriTech startups, by highlighting their contributions in response to these challenges, in addition to the difficulties they encounter. The study concludes with a set of recommendations intended to outline the main areas of focus that should be prioritized in the future to foster and advance this vital sector.

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1. Introduction

As reported by the United Nations over than 690 million persons are exposed to hunger with 250 million of such persons living in Africa, the rise that is explained by population growth. The largest population growth within all the sub-Saharan African regions of the continent with Nigeria having an approximate population of 211,400,704 persons (Izuogu, et al., 2023, p. 48). Previous debates on the economic development highlighted that modernisation of the agricultural sector through agricultural technology applications had both direct and indirect positive outcomes on all indices of growth, economic transformation and human development (Onomu & Aliber, 2024, p. 1002). While the significance of adopting climate-smart strategies and diversifying away from oil dependency considers now a necessary to empower food security and resilience, in light of climate change and environmental challenges (Adeyemo, Olagunji, Ilesanmi, & Lawal, 2025, p. 4). These challenges lead to the emergence of Agritech “agricultural technology”, a field where modern technology meets agriculture to enhance the efficiency, sustainability and effectiveness of agricultural production (Nigeria Tech Summit, 2024).

Therefore, considering this conceptualization, the objective of this study is discovering the agritech state of Nageria as an example of developing countries, by highlighting the main technologies and innovation adopted in the field, as well as identify the reality of startups activity in this sector. Meanwhile, the key obstacles that hinder the growth and development of the agricultural sector and directly affect the achievement of the sustainable agriculture development in the country needed to be discuss by answering the research main problematic: *What does the present Agriculture landscape reveal about the growth opportunities and key challenges for AgriTech startups in Nigeria?*

The importance of the study

This study is significant due its contribution to comprehending the technological shift of diversified sectors, precisely the agriculture one in the presented work. Since considerable experiences were notably successful as result of the technology revolution. This study will serve to advance a clear identification of potential avenues, particularly for countries experiencing similar conditions.

Research methodology

In order to address the multi dimensions of the study’s main pillars, the descriptive-analytical approach was employed. The aim of this approach is to provide well-grounded understanding of the main factors driving the agritech shift in Nigeria.

2. A review of AgriTech

AgriTech defined as the application of tools, machines, and techniques in agricultural enterprises. It also entails the scientific techniques that modify the attributes of farms, products, inputs and farming systems. Gene improvement, blockchain, general biotechnology and hydroponics serve as a core components of agricultural technology (Onomu & Aliber, 2024, p. 1001). By adopting technology-based solutions, startups as “A temporary organization designed to search for a repeatable and scalable business mode” (Blank, 2015,

p. 17), undertook the mission of transforming the obstacles that the agriculture sector face into profitable opportunities.

Agricultural innovative technology development, awareness, and adoption are progressing. Contemporary technologies, such as drones, AI, block chain, hydroponics, robotics and automation are gaining widespread adoption in the agricultural sector (**Onomu & Aliber, 2024, p. 1002**). Table (1) represents the 10 Emerging Trends in Agriculture Technologies:

Table 1. 10 Emerging Trends in Agriculture Technologies.

S/N	Agtech Solutions	Description
1	Ag Biotechnology	On-farm inputs for crop & animal ag including genetics, microbiome, breeding, animal health
2	Farm Management Software, Sensing & IoT	Ag data capturing devices, decision support software, big data analytics
3	Farm Robotics, Mechanization & Equipment	On-farm machinery, automation, drone manufacturers, grow equipment
4	Bioenergy & Biomaterials	Non-food extraction & processing, feedstock technology, cannabis pharmaceutical
5	Novel Farming Systems	Indoor farms, aquaculture, insect & algae production
6	Supply Chain Technologies	Food safety & traceability tech, logistics & transport, processing tech
7	Agribusiness Marketplaces	Commodities trading platforms, online input procurement, equipment leasing
8	Farm-to-Consumer eGrocery	Online platform for farmers to sell and deliver their produce direct to customers
9	Ag Crowdfunding	ag crowdfunding online platform
10	Vertical Farming	Soilless farming techniques such as hydroponics, aquaponics and aeroponics

Source: (Idahota, 2020)

Table (1) represents the top 10 emerging agritech (agtec) solutions around the world. These trending solutions made a significant changing on the agriculture landscape especially in the developed countries, compared to their application and impact in the developing countries.

The incorporation of digital technologies, data analytics, and automation has revolutionized post-harvest handling and processing in the agriculture sector. Internet of Things (IoT) devices are employed to monitor storage conditions, moisture levels, beside additional factors in real-time. Data analytics help in forecasting potential issues and maximizing storage efficiency and processing practices, predicting climate conditions and potential pest infestation. Additionally, automation technologies help improve sorting, grading, and packaging, decrease labour costs, and general efficiency as well (**Sanusi, et al., 2025, p. 10**). One of these revolutionized practices in the agriculture field presented by Precision agriculture, a modern practice that necessitates the suitable use of technology and farming systems. It entails proactive measures that stimulate exact inputs applied according to information from data (**Onomu & Aliber, 2024, p. 1012**). This emerging approach utilizes remote sensing, drones, and Geographic Information Systems (GIS) to revolutionize rice cultivation. These solutions play a crucial role in monitoring crop health, soil moisture levels, and pest infestations, enabling farmers to make evidence-based decisions and streamline resource allocation (**Sanusi, et al., 2025, p. 9**). Sensor technologies and computer vision systems have been adopted within post-harvest processes to monitor factors such as garin

quality, moisture content, and contaminants, allowing real-time parameters adjustments (Sanusi, et al., 2025, p. 10). Extension services help foster knowledge, skill, information, and advice to unleash most smallholders' built talents and entrepreneurial behaviours, strengthening and advancing their products and proficiency in adopting new techniques. Meanwhile, the application of irrigation technology also carries out a vital role in agricultural activities including Terraced, Furrow, Drip, Centre Pivot, and Sprinkler Irrigation Systems. Tracking sensors, Geographic Information Systems (GIS), and Global Positioning System (GPS) were additionally recognized as having the leverage to foster precision agriculture in live stock management and tracking, also contributes in efficient yield documentation to facilitate precise data analysis. Biotechnology enable the cultivation of pest and disease-resistant hybrids, thus reducing pesticide application, disease, and pest incidences, leading to agricultural sustainability. Residue recycling technology creates organic residue that improves soil fertility. (Onomu & Aliber, 2024, p. 1011).

Another tool represents the modern agriculture is the Agritech Apps as Specialized applications provide farming advice, weather forecasts, pest monitoring, and other agronomic support. They support farmers with information and tools to boost productivity. Likewise, E-commerce platforms create connections between different stages of the value chain, from cultivation to consumption. They contribute to optimize resource use, secure product quality, and increase logistics efficiency. These platforms serve as a central hub where data is exchanged, and resources are assigned more efficiently (Sanusi, et al., 2025, p. 13). Information and communication technologies have been also recognized as tools to arrive at quick answers to market information challenges. Thus, enables processes, storage, implementation, installation, or transmission of information (Onomu & Aliber, 2024, p. 1010).

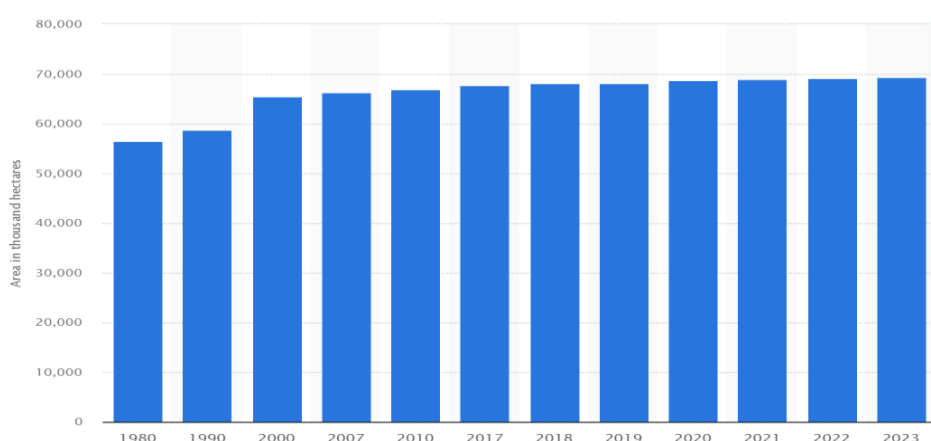
This reinforces the notion that Agritech platforms, through precision farming techniques, analytics, and resource-efficient technologies, can minimize the environmental footprint of farming. Which will directly lead to more durable agricultural practices, conserving biodiversity, decrease water waste, and diminishes the consequences of climate change (Sanusi, et al., 2025, p. 16).

Additional evidence on the importance of capital-intensive investments such as mechanisation, irrigation, and modern farming techniques in fostering productivity within this sector. Therefore, the absence of consistent reinvestment in modern equipment, infrastructure, and technological upgrades, the initial productivity gains from capital accumulation might weaken, reducing its long-term impact (Adeyemo, Olagunji, Ilesanmi, & Lawal, 2025, p. 9). In 2024, agritech startups across Africa scured nearly US\$65 million, holding most of investment going to marketplaces and fintech-related solutions (Farming, 2025).

3. Agriculture in Nigeria: key indicators

According to the international Renewable Energy Agency (IRENA) estimation, the renewable capacity may rise considerably 50 % globally by 2030. In this shifting landscape, Nigeria's persistent reliance on oil could lead to a deep economic crisis, necessitating a fundamental shift towards diversification, innovation, and a revived attention to other sectors such as agriculture (**Adeyemo, Olagunji, Ilesanmi, & Lawal, 2025, p. 2**). On the Global Hunger Index, Nigeria converted from 39.5 points in 2000 (alarming) to 28.3 in 2021 (serious) (**Izuogu, et al., 2023, p. 48**). For instance, the reported 2024 food security statistics indicate that 79% of Nigerians live in one form of food insecurity crisis, the rest of which 20% are exposed to extreme food insecurity and 59% suffer moderate food insecurity (**AGRIS, 2025**). Nigeria has the top population ranking in Africa, with an average of 216,783,381 people as of 2022, The estimated projection of Nigeria's population growth is projected to be 400 million by 2050. Its total land mass reflecting an average of 923767 km². However, a latest report by the Food and Agriculture Organization (FAO) shows that its agricultural land is approximately 71 million hectares. The agricultural land indicates 77% of the country's total land mass (**Onomu & Aliber, 2024, p. 1003**). Nigeria relies on less than half of its 71 million hectares of arable land. Challenges like poor infrastructure, restricted funding, fragile supply chains, and a absence of modern tools for smallholder farmers have hindered the sector from fulfilling its potential (**Farming, 2025**). Once a dominant force in the 1960s, facing today a serious drop due to lower productivity of crops, poor infrastructure, and funding gaps. Driving 66 million small-holder farmers in Nigeria fighting the rapidly growing demand and market (**Entrepreneurs, 2025**). Nigeria's agriculture budget represents 1.8% of the overall 2020 budget size. This is considerably below of the 10% outlined in the Maputo Declaration (**IFAD, 2025, p. 7**). The existing conditions made the agriculture in Nigeria crucial for the country's endurance, safeguarding the livelihoods of 224 million citizens (**Entrepreneurs, 2025**). Figure (1) illustrates the Total agricultural land area in Nigeria between 1980 and 2023:

Fig.1. Total agricultural land area in Nigeria in selected years between 1980 and 2023



Source: (Statista, 2025)

Nigeria has immense agricultural potential remains underexplored and underutilized, employing not less than 70% of the labour force (**Onomu & Aliber, 2024, p. 1004**). Statistics reveals that this sector contributing estimation about 26,48% to the GDP in 2021 (**Adeyemo, Olagunji, Ilesanmi, & Lawal, 2025, p. 2**). Research indicates that Nigeria's agricultural sector leans more toward smallholder farming, with not less than 70% of farmers included in this category. Smallholders produce 80% of the local staple foods (**AGRIS, 2025**). The Nigerian agriculture sector is divided into four main subsectors: crop production, fisheries, livestock and forestry. Crop production on the top of the list with 70.8 million hectares of agricultural land producing key staples such as maize, rice, cassava and millet. In 2017, cassava production reached 59 million tonnes, positioning Nigeria as the world's largest producer, with significant potential for value addition and definitely revenue generation (**Adeyemo, Olagunji, Ilesanmi, & Lawal, 2025, p. 2**). In 2019, agriculture recorded a contribution lower than 2% of total exports relative to petroleum (76.5%). Nigeria's core agricultural imports incorporate sugar, wheat, milk, and fish, while the principal agricultural exports cover sesame seeds, cacao beans, cashew nuts, ginger, cotton, and frozen shrimp. Sesame, cacao, and cashew nuts contribute to more than half of the nation's agricultural exports, while wheat leads agricultural imports. Furthermore, the Nigerian agricultural exports have risen to a five-year high in 2022 (**IFAD, 2025, p. 6**). Moreover, the country's agricultural sector leads the world as the top producer of Sorghum, cowpea, and yam (**Onomu & Aliber, 2024, p. 1004**). In spite of this, Nigeria continues as a net food importer, where the agricultural trade deficit has broadened, with imports outpacing exports by N689.7 billion in 2019 compared to N549.3 billion in 2018 (**IFAD, 2025, p. 6**).

The overarching challenges restrict progress including insecurity, rising input costs, climate change, post-harvest loss, low levels of irrigation, and poor transportation and cold chain networks. Government policies have sought to address these challenges with limited success (**Trade, 2025**). An unexploited potential due to limited resources and inefficient supply chains were also noted. This environment created a pressing need for innovative solutions that would reduce the associated costs to foster improvements, setting the stage for AgriTech (**Entrepreneurs, 2025**). The efforts made by the government to meet these challenges have been embodied in the Agricultural Transformation Agenda (ATA), that was introduced around 2015 to modernize the sector through the promotion of digital technologies (**Adeyemo, Olagunji, Ilesanmi, & Lawal, 2025, p. 3**). The government has also implemented various policies with main aim to support and foster the development of the country's agriculture market. The Anchor Borrowers Program was one of the outputs of the government initiatives aimed at providing financial support to smallholder farmers. The Growth Enhancement Support Scheme which offers subsidized inputs to farmers. While the Livestock Transformation Plan focuses on boosting livestock production (**Deep, 2025**).

4. AgriTech landscape in Nigerai: empirical evidence

The technological conversion of the agricultural sector in general, and precisely agribusinesses and farming in Nigeria is driven by mainstream technologies such as digital mapping, mobile apps, big data, field sensors, cloud-based business systems, and smart farming equipment beside other innovative technologies (**Idahota, 2020**). Nigeria has a prospective enabling environment for digitalization in agriculture with a score of 4.5 out of 9 in the World Banks' Ease of Business in Agriculture (EBA), Information and Communications Technology (ICT) (**Izuogu, et al., 2023, p. 48**). With the aim of using ICT and other modern apps, the government of Nigeria has mapped a digital agriculture strategy (2020-2030). Accordingly, in June 2021, a training program was organized on WeedManager and RiceAdvice, along with the E-Wallet app which had already developed (**Onomu & Aliber, 2024, p. 1011**). With many farmers demonstrating readiness to pay for technology adoption, more market for engaging technology services will be under demand (**AGRIS, 2025**).

Agritech apps become crucial tools for risk mitigation. where the weather forecasts integrated into these applications authorized farmers to adjust their farming activities to the uncertain situation. Moreover, pest monitoring features aid in recognizing and addressing potential threats instantly, thus minimizing the risk of crop losses (**Sanusi, et al., 2025, p. 13**). Similarly, climate-smart practices, like the use of drought-resistant seed, precision agriculture tools like drones, and other solar-powered irrigation, are being increasingly adopted (**Adeyemo, Olagunji, Ilesanmi, & Lawal, 2025, p. 2**). Information technology has connected farmers to market information within the country to the global market. It supports market participation in reducing the spending on transportation allowing know the market condition. ICT plays a crucial role in the planning, clearing, cultivation, harvesting, processing, and selling of agricultural products (**Onomu & Aliber, 2024, p. 1010**). Meanwhile, Cost efficiency is another essential dimension of Agritech apps in the corps value chain. By offering insights into best farming practices and real-time market rates for essential inputs such as fertilizers and seeds, these applications enable farmers to make measured and cost-effective choices (**Sanusi, et al., 2025, p. 13**).

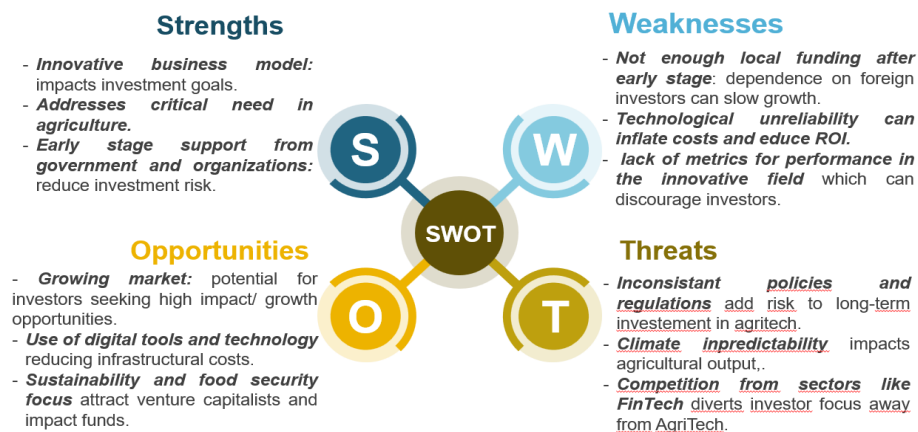
Investing in AgriTech sector appears to offer significant potential, the country's large agricultural base, increasing adoption of technologies and intense market demand contribute in creating substantial opportunities (**Entrepreneurs, 2025**).

Fig.2. : SWOT Analysis of Agritech Ecosystem in Nigeria.



Source: (Idahota, 2020)

Fig.3. SWOT analysis of AgriTech companies' investment in Nigeria



Source: (Entrepreneurs, 2025)

Both Figure (2) and Figure (3) represent an analysis of key strengths, weaknesses, threats and opportunities areas of the Agritech Ecosystem and AgriTech companies' investment in Nigeria respectively. The analysis reveals that a set of factors affect the development of the agricultural sector in the country, with a particular focus on the agritech field. A range of barriers was also highlighted.

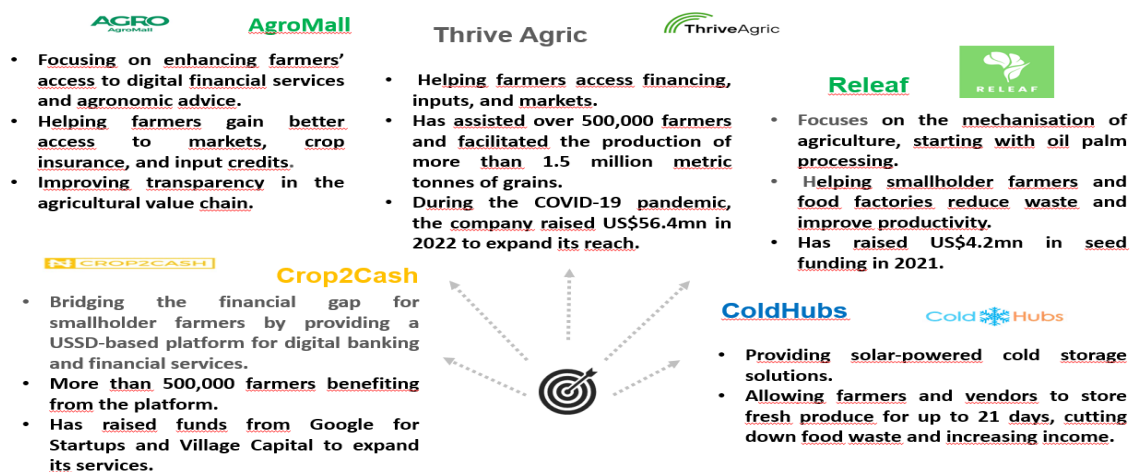
Digitalization of the agricultural sector in Nigeria has boosted the exchange of information and ideas. This may further facilitate decreasing production cost and risk as farmers are permitted to make wise decisions, assist in addressing knowledge gaps, illustrating that most of the farmers can access advisory services. In addition to rise in food security while minimizing agricultural environmental impact (Izuogu, et al., 2023, p. 56).

5. AgriTech Startups in Nigeria: Key Drivers and Emerging Opportunities

AgriTech in Nigeria imposes itself as a solution to long-standing challenges. AgriTech startups and SMEs are transforming barriers into new opportunities, providing durable solutions to reframe the future of farming (**Entrepreneurs, 2025**). Over the past few years, agritech startups in Nigeria have become key players tackling the inefficiencies with scalable digital solutions, designed for smallholder farmers. These startups use data analytics, mobile platforms, AI, and satellite technology to transform farm management, market access, and productivity. The trend of technology adoption is guided by both homegrown talent and international investments, with over \$150 millions allocated to agricultural tech between 2023 and 2025 (**Farmonaut, 2025**). Over the past 10 years, an average of 24 new companies have been launched annually. Particularly, numerous startups were established by alumni of Booth School of Business, Cornell University and Duke University (**Tracxn, 2025**).

As of 2024, Nigeria is home to 230 agritech startups, a significant increase from just 23 in 2022. In spite of the sector's growth, agritech remains inadequate in funding compared to fintech. In 2024, agritech startups across Africa generated US\$ 65mn, with the majority directed toward marketplaces and fintech-related agritech. Meanwhile, Nigeria's fintech sector has captured significant investments, emphasizing the misalignment between agriculture's importance to the economy and its investment levels (**Farming, 2025**). The most notable agritech startups represented by 'Thrive Agric', and 'Farm Crowdy' which hold online platforms that permit investors to invest in farming projects. 'Hello Tractor' provides renting services and data analytics of farm equipment. 'ReLeaf', offers logistical solutions from farmers to food companies, using technologies to rise the output of pre-industrialised food sustainably (**Entrepreneurs, 2025**). E-commerce platforms like FarmCrowdy and AgroMall have empowered over 50,000 farmers to sell their products directly to buyers, minimizing reliance on third parties (**Sanusi, et al., 2025, p. 13**).

Fig.4. Top AgriTech Startups in Nigeria



Source: (Farming, 2025)

Fostering the access to digital tools was among the main goals of the startup's activity, providing a financial infrastructure and helping farmers to improve their productivity remain also as a core focus to these AgriTech Startups.

The evidence indicates that the great majority of Nigeria's digital agriculture startups are e-commerce platforms that bridge producers, processors, and marketers with buyers, large-scale or small-scale, followed by fintech services. The two types of solutions account for approximately 65% of the digital agriculture startup market, succeeded by AI/IoT at 13%, Farm and supply chain management at 8.7%, Information and knowledge collectively represent 4.3%, and others at 8.7% (IFAD, 2025, p. 11). Figure (5) represents an examples of Nigerian agritechs:

Fig.5. Examples of Nigerian agritechs

Company	Founded	Use cases	Cumulative users*
AFEX	2014	 	106,000
AgroMall	2016	 	530,000
BeatDrone	2015		300
Crop2Cash	2018	 	1,000
FarmCrowdy	2016	 	25,000
Hello Tractor	2014		5,000
Thrive Agric	2016	 	22,000
TradeBuza	2018	 	2,000
Verdant AgriTech	2014		8,000

* Cumulative users refers to the total number of historical users up to November 2019.

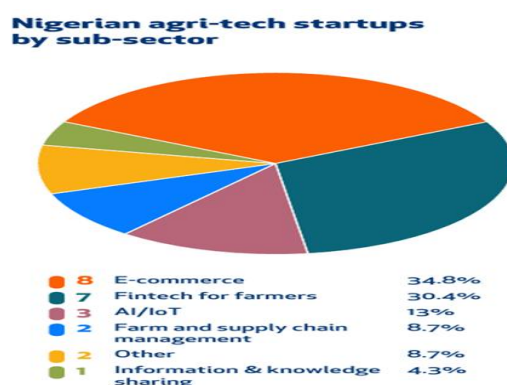
 Digital procurement  Smart farming  Digital finance  Information services

Source: (Raithatha & AgriTech Insights Manager, April 2020, p. P15)

Figure (5) represents the top Nigerian agriTech startups that offer a set of diverse digital solutions to tackle challenges facing the agriculture sector. Many of these startups adopt more than one digital solution within the agritech solution such as: AFEX, AgroMall, Crop2Cash, FarmCrowdy, Thrive Agric, and TradeBuza. The main goal of these startups can be summarized in improving the livelihoods of smallholder farmers. Meanwhile, such complicated sector needs a strong collaboration, a combination of efforts needs to be embodied to rise the expected outcomes. Since the agriculture sector is considered as a promising field for innovative and technological practices.

Although the growth of AgriTech startups has shown a notable increase across different sectors Figure (6), a specific external factor may create more favorable environment for some than others. This is reflected in the revealed statistics in Nigeria, where the most effecting factors include government support, infrastructure, technology accessibility and the encouraging ecosystem.

Fig.6. Nigerian Agri-Tech startups by sub-sector



Source: (Africa, 2022, p. 27)

Nigeria's agri-tech startups are predominantly either e-commerce platforms with 34.8% or fintech services with 30.4%, which help farmers access necessary financing for inputs or to scale their businesses. While AI/IoT, and farm and supply chain management coming in third and fourth.

The statistics reveals that these agri-tech startups employ about 612 individuals, an average of 27 per startup. The largest employers are ThriveAgric (242), Afrimash (42), and Hello Tractor (39). while only one of them has a female co-founder (Africa, 2022, p. 27).

Working in such complex and challenging sector, and within an even more unpredictable environment makes the activity of AgriTech Startups a difficult endeavor. Thus, it will lead to variations in their outcomes. Meanwhile, innovative ventures, such as these startups, poses certain advantages that equip them with specific strengths. Table (2) represents the both sides including strength and weakness areas facing the activity of Agritech platforms in Nigeria:

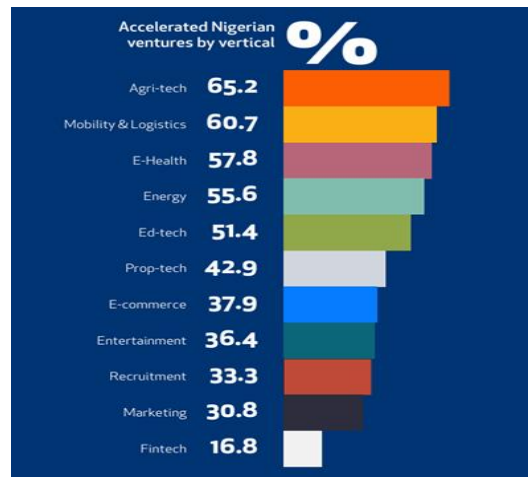
Table 2. Agritech platforms strengths and weaknesses for enhancing the agricultural value chain in Nigeria.

Agritech platforms	General description	Strengths	Weaknesses
FarmCrowdy	Crowdfunding platform connecting investors with rice farming projects. They are involved in digital procurement and digital finance.	Enables collaboration and financing for farmers. Enhances transparency by allowing investors to track progress.	The issue of trust between the investors and farmers. Challenges in ensuring uniform quality across projects. Accessibility might be limited by the digital divide.
AgroMall	AgroMall are involved in digital procurement and digital finance.	Offers end-to-end support, enhancing efficiency and collaboration. Addresses multiple aspects of the value chain.	Requires robust digital infrastructure. Might face resistance from traditional stakeholders.
ThriveAgric	ThriveAgric platform providing investment opportunities in rice farming projects.	Brings capital and community involvement to rice farming. Job creation and increased profitability for farmers.	Challenges in maintaining consistent quality standards. Reliance on investor confidence.
Babban Gona	Franchise model offering training, financing, and market access support for farmers.	Combines multiple support elements, ensuring quality control and sustainable practices.	Scaling might challenge personalized support and quality assurance.
RELEAF	Platform focusing on agro processing, connecting fabricators and processors to raw materials.	Enhances collaboration between fabricators and processors. Reduces post-harvest losses.	Impact tied to availability of processing facilities and technology adoption by fabricators.
Zensus	Technology platform providing precision agriculture solutions, including soil and weather sensors.	Enhances precision in farming through data-driven insights. Optimizes resource usage.	Requires technology adoption by farmers. Challenges in integration with existing practices.
Agrikore	Blockchain-based platform offering supply chain management and traceability solutions for agriculture. Agrikore provides a platform where farmers can directly reach out to consumers and vice versa. This eliminates the need for middlemen, thus cutting down costs and increasing profits for farmers.	Enhances transparency and trust in agricultural transactions. Provides traceability across the value chain.	Requires technology literacy. Adoption challenges in certain segments.
HelloTractor	Mobile app-based platform offering on-demand tractor services for farmers.	Enhances mechanization in agriculture. Improves access to tractor services, increasing efficiency.	Requires widespread availability of tractors and digital infrastructure. Challenges in rural areas.

Source: (Sanusi, et al., 2025, p. 17)

When it comes to supportive ecosystem, incubators and accelerators play a vital role in monitoring, guiding startups, which are the most likely to be in such initiatives (Figure 4). Agri-Tech, mobility and logistics, e-health, e-commerce, ed-tech and energy startups seems to be the most likely to have taken part in such programmes, Agri-Tech holds the highest share comparing to other types of startups, standing at 65.2%.

Fig.7. Accelerated Nigerian Ventures



Source: (Africa, 2022, p. 46)

The evidence reveals that 150 private and public incubator and accelerator programmes available to startups in Nigeria. Nigerian startups positions itself as continental leader in terms of being selected by international accelerators such as Y Combinator, Techstars, 500 Startups, Google for Startups and Facebook Accelerator (Africa, 2022, p. 45).

For its part, the Nigerian Government founded the Nigerian Student Venture Prize (NSVP), in 2019, aiming to support and showcase unique business ideas and entrepreneurship among university students, along with contributing to bridge the gap between the academic world and the business community (Africa, 2022, p. 47).

Table 3. Examples of start-up funders in Nigeria

Funder	Definition	Examples of investors active in Nigerian agritech
Accelerator	Accelerators support early-stage, growth driven start-ups through education, mentorship and financing typically for a fixed period of time and as part of a cohort of companies.	Ventures Platform, Itanna Accelerator
Angel Investor	An individual or group of individuals who use their personal money to finance companies.	Rasheed Olaluwa, Tomi Davies
Corporate Investor	Corporate investors invest strategically, such as buying a company to access its proprietary technology. They are similar to venture capital firms and are often referred to as corporate venture capital.	
DFI	Development finance institutions (DFIs) are specialised, government-owned organisations that invest in private sector projects in low- and middle-income countries to promote job creation and economic growth.	FMO

Donor	A company, individual or government agency that provides capital to a start-up or company without taking an equity stake in the company.	Tony Elumelu Foundation, GIZ, UK aid, Australian Aid
Impact investor	Impact investors aim to generate specific beneficial environmental or social effects in addition to financial gains.	GreenTec Capital Partners
Incubator	A company that helps start-ups during the early stage to develop from ideation to product or service development. Incubators typically provide desk space, mentorship and other business advice.	Passion Incubator, Wennovation Hub
Private Capital	Private equity firms source investment capital from high net-worth individuals and firms and typically invest in companies during the later stages of growth in order to take control of them.	Ajayi Solutions, Cox Enterprises
Venture capital	Venture capital firms invest in companies, typically those with long term potential, using funds raised from pension funds, endowment and wealthy individuals.	Consonance Investment Manager, Timon Capital

Source: (Raithatha & AgriTech Insights Manager, April 2020, p. 19)

The financial resources remain the big obstacle faces the startups around the world, and it is the same case for the Nigerian once also. Table (3) represents a set of finders within the Nigerian agritech context that generally cover the 3 main stages of startups lifecycle. Funders such as incubators, accelerators, angel investors and donors represent the early-stage funding, investors such as impact investors and venture capital firms indicate mid-stage funding. Although, late-stage funding represented by investors such as private equity firms and corporate investors, are presently inactive within the agritech field.

Table (4) highlights the core components of AgriTech in Nigeria:

Table 4. Key Agritech Innovations in Nigeria

Key Agritech Innovation	Explanation
Digital Marketplaces	E-platforms connect farmers directly with buyers, reducing middlemen and ensuring fair pricing (e.g., Farmcrowdy, AgroMall).
Fintech & Credit Platforms	Startups provide customized financing, mobile payments, and insurance, bridging the credit gap for rural farmers.
Precision Farming	Companies like Zenvus deploy soil sensors, satellite data, and AI to help farmers optimize inputs for higher yields.
Supply Chain & Logistics Management	Platforms use data analytics and blockchain for transparent, efficient farm-to-market logistics.

Source: (Farmonaut, 2025)

The arising synergetic preparations which have have led to boost the agricultural productivity and farm income, digitalization has made the agricultural sector more attractive to young farmers (Izuogu, et al., 2023, p. 56). The growth of these agritech companies is a step towards redefining Nigeria's agricultural sector. Innovations that enable farmers, improve food security, and minimize waste are becoming more ssential (Farming, 2025). While, recent advancements in field of mechanization, climate-smart practices and digital technology have

led to improved productivity. Mobile technology has also revolutionized agricultural information access (Adeyemo, Olagunji, Ilesanmi, & Lawal, 2025, p. 2).

In 2023, the country imported \$6.6 billion of agricultural and linked goods, a 15% drop from 2022. In 2023, agricultural and associated exports from Nigeria to the world were estimated at \$2.3 billion, a 24 percent increase over the preceding year. U.S. imports of Nigeria's agricultural and related goods reached \$118 million, a 37 percent increase from 2022. Top U.S imports from Nigeria included specialty plant products, cocoa products, soybean cake, and cashews (Trade, 2025). This revolutionized orientation is currently helping to draw investment into the country's technology sector and create jobs, thus boosting the local economy and fostering Nigeria's position in the global technology community (Nigeria Tech Summit, 2024). Particularly, Agritech solutions are empowering rural communities, building food security, and diversifying Nigeria's economy shifting away from oil reliance (Farmonaut, 2025).

5. Key barriers to the effective development of Agritech startups in Nigeria

Agricultural growth in Nigeria is far below the 10% requirement for food security and poverty reduction due to most agriculturists' small and unchanging nature. While Nigeria has undertaken notable initiatives to confront multi-dimensional obstacles and transform the agritech sector, these efforts have yet to yield significant results, due to the fast-growing nature of Nigeria's population, domestic demand for agricultural products in Nigeria, this has stimulated the national food deficit and caused a rise in food shortages (Onomu & Aliber, 2024, p. 1004). Weak institutional support, brain drain, an inadequate and underfunded educational system and poor infrastructure were also identified as significant obstacles hindering technological advancements in the country. While communication emerged as a major barrier to agriculture innovations among rural farmers (Adeyemo, Olagunji, Ilesanmi, & Lawal, 2025, p. 5).

Despite the advancement these startups are making, insecurity persists as major challenge. Farmers in northern and central Nigeria are often displaced by violence, disrupting harvest cycles and increasing operational costs. These security risks may restrict the potential of agritech, emphasizing the necessity for a more comprehensive approach to tackling agricultural challenges (Farming, 2025). Poor funding affects the diffusion and adoption of technology, where almost all successful irrigation projects in Nigeria are either initiated or financially supported by external stakeholders such as the World Bank, FAO. In addition to the fear of perceived risks such as hacking of the app, technical glitches, and likely failures associated with the system. The cost of data and expensive nature of the machine are also among the main challenges (Onomu & Aliber, 2024, p. 1014).

Research studies has also indicated that most smallholder farmers face the insufficient information technologies for accessing agricultural output/input market information. Thus,

information technology has not produced the required results to revolutionize the Nigerian agricultural sector. Experience and awareness both influence the use of mobile apps, as poor awareness results in a minimal level of adoption, Low levels of education also affect. While inadequate knowledge and poor use of GIS and GPS have affected the adoption of precision agriculture in Nigeria. Evidence suggests that only 0.3% of the farmers in South-West Nigeria assessing soil fertility using soil tests technology and digital applications, respectively. Limited extension services are also noted (**Adeyemo, Olagunji, Ilesanmi, & Lawal, 2025, p. 9**). In the investigation of drone utilisation among farmers in Nigeria, the result indicated that at least 66% of all the farmers agreed that drones are poorly and less used. The irrigation system also from its side faces a set of problems like poor maintenance culture and lack of commitment from both government and staff members. In furthermore, poor water management, Inefficient and inconsistent government provision of water subsidies has also been noted (**Onomu & Aliber, 2024, p. 1013**). When it comes to the engagement of corporate sector to support the growing startup ecosystem, this key player is largely absent (**Africa, 2022, p. 10**).

On other hand, Nigeria's fintech sector continues to attract far larger sums, emphasizing the imbalance between funding and agriculture's economic importance and its investment levels (**Farming, 2025**). In turn, the Federal Government support toward the startup ecosystem has remained limited. Whereas, uncertain regulatory has played a role to undermine the development of the ecosystem with unhelpful policies (**Africa, 2022, p. 49**).

6. CONCLUSION

As a core pillar of the economy of all countries, the agriculture sector considered highly critical. In Nigeria, despite the existence of some initiatives from the part of the government. However, these efforts remain relatively modest. Meanwhile, dynamic environment and global developments necessitate radical measures and comprehensive framework, an integrated system to support the agricultural transformation process.

Such transformation reflects one of the most effective tools to tackle challenges linked to food security and sustainable agriculture development. AgriTech in Nigeria demonstrates how innovation can transform vital sectors such as agriculture. Despite challenges such as lack of funding or insufficient infrastructure, the poor investment opportunities, substantiated by an increasing demand for sustainable farming using digital tools. AgriTech startups play a crucial role in linking farmers to the market. Yet, individual efforts, such as those conducted by evolving **AgriTech Startups**, remain under expectations in the absence of enabling environment that promotes this modern orientation. These limiting factors have further prevented some agritech innovative thinkers from developing more evolved agritech solutions with the aim of boosting productivity and profitability in the same time.

Based on the analysis explored in this paper, a set of recommendations can be articulated, summarizing the main insights derived from the Nigerian experience. These perspectives can serve as a guiding framework for fostering agricultural transformation within the context of any other developing country, given the significant similarities they have in common in attributes and challenges:

Sustainable agriculture development framework should be established from the part of the government to ensure the proper and continuous implementation of agriculture policies. A deep consideration toward subsidies and tax incentives for technology adoption that help reduce costs must be taken as well.

Technology adoption: in light of the transformative potential of technology to improve productivity and even the agriculture sector performance, **Agritech** has become a necessity and priority for the economic revolution.

Strengthen agriculture education and training: emphasizes the necessity of institutional capacities through continuous training and agricultural education. Universities and technical institutions play a vital role within their contribution and collaboration in programs that provide a professional training based on technology and innovation improving farmers outcomes.

Partnerships: Promoting for public-private partnerships helps fostering the design of various technologies precisely tailored to local contexts and economics realities.

Financial investments infrastructure: encouraging investment, allocating resources, especially in the research and development area will help the agriculture sector transformation and give access to wild range of opportunities for the project owners.

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