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RESEARCH

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Challenges and strategies in Nigerian agribusiness entrepreneurship for sustainable development

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Abstract

This study examines the challenges and opportunities in Nigeria's agribusiness sector using qualitative methods, including 28 in-depth interviews, 4 focus group discussions, and 36 key informant interviews across four states. A SWOT analysis highlights strengths like abundant land, a young population, and government support, alongside weaknesses such as low technology use, poor infrastructure, and educational gaps. Opportunities include commercial farming, agrotourism, and foreign investment, while threats involve insecurity, climate change, and skill deficiencies. The study emphasizes public–private collaboration and proposes strategies like improving policy environments, enhancing food safety, boosting human capacity, and increasing financial access to drive productivity and sustainability in the sector. These strategies collectively contribute to SDG 12: Responsible Consumption and Production by promoting sustainable practices in agriculture, which are vital for long-term environmental and economic sustainability.

Keywords Sustainable agribusiness, Entrepreneurship, SWOT, Agrotourism, Rural infrastructure, Qualitative analysis

Introduction

The challenge of addressing global food security is paramount, especially in low-income countries facing rapid population growth. By 2050, the global population is expected to reach 9.7 billion, with the number of undernourished people projected to rise from 380 to 840 million by 2030 (Wudil et al. 2022; Ritchie et al. 2023). There is sufficient evidence to show that about 10% of people are facing severe food insecurity globally whereas in Sub-Saharan Africa, over 30 percent of the region's population are suffering from severe food insecurity (Wudil et al. 2022; World Health Organisation 2019; O'Connor et al. 2017). Despite the steady increase in global food production, inefficiencies in value chain systems, notably in low-income nations, continue to obstruct food distribution, contributing to hunger (Xie et al., 2021). In this context, agribusiness entrepreneurs play a crucial role in identifying opportunities within agriculture to achieve sustainable food production and distribution, particularly in sub-Saharan Africa.

According to Nkosi et al. (2024), the agricultural sector of Sub-Saharan Africa is full with untapped potential for investors, technology designers, and manufacturers. The literature highlights how small farm businesses could conveniently thrive when government creates supportive environments for agricultural investments, particularly by providing grants, training, and fostering public–private partnerships. In Nigeria, agribusiness entrepreneurship has garnered increasing attention due to population growth and limited alternative employment opportunities. The agribusiness sector is pivotal to the Nigerian economy, contributing significantly to employment, national income, and economic stability.

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Agriculture, together with agribusiness, is projected to become a USD 1 trillion industry in Sub-Saharan Africa (SSA) by 2030, compared to USD 313 billion in 2010, emphasizing its critical role in economic transformation (Bjornlund et al. 2020; World Bank, 2018). In Nigeria, agriculture alone accounts for about 24% of GDP, with agribusiness activities such as input supply, processing, marketing, and retailing contributing an additional 20% (OECD & FAO, 2016). In Nigeria, approximately 85 million individuals are employed in the food economy, with over 75% of these jobs concentrated in agriculture. Of the total employment, around 65% are based in local communities, while about 20% are involved in food processing, marketing, and activities outside their local areas (Osabuohien et al., 2018; Alola & Alola 2019). This sector not only provides livelihoods for millions, but also has the potential to drive industrialization and economic diversification.

However, despite its potential, Nigeria's agribusiness sector remains underdeveloped, facing significant challenges such as low productivity, poor infrastructure, and limited access to modern agricultural inputs. These challenges are exacerbated by historical neglect and a focus on subsistence farming for food security, which has limited the sector's growth and competitiveness. Scholarly research has increasingly focused on evaluating the current landscape, identifying gaps, and offering insights for policymakers (Payumo et al. 2017; Olaoye 2014). The sector's underperformance is evident in Nigeria's declining share of global agricultural exports, which contrasts sharply with the successes of other developing regions like Asia and Latin America (USDA-Economic Research Services 2022; Fuglie & Rada, 2013).

This study aims to address the critical research gap in understanding how Nigeria can leverage its agribusiness sector to achieve sustainable economic growth. While much attention has been given to agricultural production, the integration and development of agribusinesses—from small and medium enterprises to multinational corporations—remain insufficiently explored. This research, therefore, seeks to provide insights into the challenges and opportunities within Nigeria's agribusiness sector and propose strategies for enhancing its contribution to the nation's economic transformation and food security.

Objective

This study aims to assess the perceptions of stakeholders regarding the development of agribusiness entrepreneurship in Nigeria. The research process consisted of two phases. The first phase involves identifying the internal strengths and weaknesses, as well as external opportunities and threats, perceived by stakeholders as major factors influencing agribusiness entrepreneurship development in Nigeria. This information will be valuable in formulating future strategies for engaging young people in this field. The second phase involved gathering and analysing stakeholders' opinions on the effectiveness of sustainable agribusiness development strategies in Nigeria. The research questions for this study are as follows: (1) What are the primary concerns of stakeholders regarding the internal and external factors that impact the development of agribusiness entrepreneurship in Nigeria? (2) What do stakeholders in the agricultural sector think about the feasibility of implementing global agribusiness practices and strategies for fostering sustainable agribusiness development in Nigeria?

Table 1 provides an explanation of the research questions listed to achieve the objectives of the study.

The other sections of the paper are organized as follows: after discussing agribusiness model innovation, section two discusses the materials and methods, section three discusses the results and discussion, section four discusses the discussion, and section five discusses the conclusion and recommendations.

Table 1 Explanation of research questions

S/N	Leverage points	Research questions
1	Strength	i. What advantage (strength) does Nigeria have over other countries in agriculture?
		ii. How strong is Nigeria's institutional framework for achieving sustainable agriculture and competitive agribusiness?
	Weakness	i. What characteristics (weaknesses) are impeding agribusiness entrepreneurship in Nigeria?
		ii. In which area (of weakness) does Nigeria need to improve in order to boost agricultural productivity?
	Opportunities	i. What agricultural products from Nigeria are in high demand both locally and internationally (opportunities)?
		ii. Can Nigeria sustain a steady increase in agricultural production while maintaining a competitive advantage (opportunity for expansion)?
	Threats	i. Is there any risk or difficulty in exploring these agribusiness opportunities in Nigeria?
		ii. What factors/issues are causing people to miss out on agribusiness opportunities?

Source: Compiled by Author, 2022

Literature review

The Nigerian agricultural sector, despite its significant potential, faces numerous challenges that impede its contribution to sustainable development. The existing literature on agricultural entrepreneurship highlights the transformative role of liberalization and globalization in driving entrepreneurship within the sector (De Lauwere 2005; Lans et al. 2004, 2014, 2017; Pyysiäinen et al. 2011; Phillipson et al. 2004). However, the context of Nigeria presents unique challenges that require a more nuanced understanding and approach to entrepreneurial development in agribusiness. This review critically examines the relevant literature to explore these challenges and the strategies that can be employed to foster sustainable agribusiness entrepreneurship in Nigeria.

Agricultural challenges in the context of liberalization and globalization

Globalization and liberalization have been widely recognized as catalysts for entrepreneurial activity in agriculture, driving farmers to adopt new business models to cope with price volatility, financial risks, and international competition (Winders 2011; McElwee 2006a, 2006b, 2006c). The liberalization wave that began in the 1960s and intensified in the 1990s, culminating in the Uruguay Round and the Marrakech Agreement, significantly opened up international markets, reducing subsidies and exposing farmers to global competition (Kay and Akrill 2009; Swinbank 1993, 2011).

In the Nigerian context, these global trends have had mixed impacts. On one hand, they have created opportunities for Nigerian farmers to access larger markets and diversify their income sources. On the other hand, the reduction in government support and the exposure to global competition have exacerbated existing vulnerabilities in the Nigerian agricultural sector, such as inadequate infrastructure, limited access to finance, and a lack of technical know-how (Naudé, 2016). The challenge for Nigerian agribusiness entrepreneurs lies in navigating these global dynamics while addressing local constraints that limit their competitiveness.

Sustainable development in agriculture: opportunities and constraints

Sustainable agriculture, which emphasizes ecological, economic, and social performance, has been identified as a crucial pathway for achieving long-term viability in the agricultural sector (De Lauwere 2009). The adoption of sustainable practices such as organic farming, agroforestry, and precision agriculture is seen as both a challenge and an opportunity for farmers (Gomiero et al. 2011). However, the literature suggests that implementing these practices is fraught with difficulties, particularly in developing countries like Nigeria, where there are significant knowledge gaps, resource constraints, and institutional barriers (Bock 2004; Marchesoni & De Ros 2009).

In Nigeria, sustainable agriculture is further complicated by the need to balance short-term economic survival with long-term environmental stewardship. For many Nigerian farmers, the immediate pressures of income generation and food security often overshadow the benefits of adopting sustainable practices. Additionally, the lack of government incentives and support for sustainable agriculture further discourages its adoption. The institutionalization of sustainability, as seen in other regions like the European Union, where policies such as the Common Agricultural Policy (CAP) reforms have promoted sustainable practices, has not been effectively replicated in Nigeria (Dwyer 2013; Öhlund et al. 2015). This gap highlights the need for a more robust policy framework that supports sustainable agribusiness entrepreneurship in Nigeria.

Entrepreneurship as a response to agricultural challenges

The literature emphasizes that in the face of liberalization and sustainability pressures, entrepreneurship becomes a vital response mechanism for farmers (McElwee 2006a, 2006b). Entrepreneurship in agriculture involves adopting new agricultural models, such as conservative agriculture, organic farming, or agroforestry, as well as exploring new business opportunities like renewable energy production (Gomiero et al. 2011). However, in the Nigerian context, the entrepreneurial response is often constrained by structural challenges, including poor infrastructure, limited access to markets, and inadequate financing options (Clark 2009; Khayri et al. 2011).

Moreover, the entrepreneurial landscape in Nigerian agriculture is diverse, with farmers adopting a range of strategies depending on their resources, competencies, and market conditions (McElwee 2006a; Pyysiäinen et al. 2006). However, these strategies are often reactive rather than proactive, driven by necessity rather than opportunity. This reactive approach limits the potential for innovation and growth in the sector, as many farmers are focused on short-term survival rather than long-term sustainability.

Challenges in adopting entrepreneurial strategies

While entrepreneurship offers a pathway to overcoming the challenges posed by liberalization and sustainability, the literature highlights significant difficulties in the entrepreneurial journey for farmers (De Wolf et al. 2007; McElwee & Smith 2012). These difficulties are particularly pronounced in Nigeria, where farmers face external barriers such as bureaucratic red tape, inadequate

support services, and gender disparities (Bock 2004; Naudé, 2016). Additionally, internal challenges, such as a lack of managerial skills, further hinder the ability of Nigerian farmers to effectively engage in entrepreneurial activities (Bergevoet, 2005; Lans et al. 2004, 2017).

The changing role of the farmer in the globalized agricultural landscape requires a new set of skills and competencies, including cost management, supply chain management, and the ability to exploit new opportunities (Pindado & Sánchez 2017). However, many Nigerian farmers are ill-prepared for these new demands, leading to poor farm performance, exit strategies under duress, and, in extreme cases, social issues such as farmer suicides (Singh & Krishna 1994; Grande et al. 2011). The literature suggests that without adequate support, many Nigerian farmers will struggle to adapt to the entrepreneurial demands of modern agriculture.

Strategies for Enhancing Agribusiness Entrepreneurship in Nigeria.

Agribusiness in Sub-Saharan Africa: potential and challenges

Agribusiness encompasses a wide range of activities, including input supply, processing, marketing, and retailing, which together contribute significantly to GDP in many African countries. Despite the sector's vast potential, agriculture and agribusiness in SSA have underperformed in recent decades, with low and stagnant productivity being a significant concern (Jayne and Ameyaw 2016). Crop and livestock yields in Africa are often half of those in Asia and Latin America, largely due to the low use of modern inputs such as improved seeds, fertilizers, and irrigation (Food and Agriculture Organization 2019).

The potential for agribusiness in SSA is immense. Africa holds more than half of the world's agriculturally suitable yet unused land, and its water resources remain underutilized (Deininger and Byerlee 2011). These factors position SSA favourably to respond to the growing global and domestic demand for agricultural products. However, the region's poor competitiveness on the global stage, as evidenced by its declining share in global agricultural exports, highlights the need for significant improvements in productivity and value chain development (Reardon et al. 2019).

Global business practices and agribusiness development

Global business practices offer valuable insights that can be adapted to the African context to enhance the performance of the agribusiness sector. Successful agribusiness investments can stimulate agricultural growth by providing new markets and developing a robust input supply sector (KPMG 2013). However, for these investments to be effective, it is essential to address the challenges of developing both downstream activities (such as processing) and upstream activities (such as input supply) (World Bank 2014). Moreover, there is a critical need to commercialize agriculture and link smallholders and small enterprises to productive value chains (Alliance for a Green Revolution in Africa 2017).

The development of agribusiness in SSA requires not only the adaptation of global business practices but also the creation of a supportive environment that fosters public–private partnerships and encourages sustainable investments (Swinnen and Kuijpers 2019). This involves implementing good policies, ensuring sustained public and private investments, and establishing transparent procedures along the entire value chain. Countries such as Kenya, Côte d'Ivoire, and Ethiopia have demonstrated that with the right strategies, SSA can tap into buoyant markets and achieve significant productivity growth in sectors like horticulture and tea (Minten et al. 2016).

Sustainable development and agribusiness

The integration of sustainable development principles into agribusiness is essential for ensuring that the sector's growth does not come at the expense of the environment or local communities. The challenge in SSA is to harness private sector interest in agribusiness in ways that generate jobs, provide opportunities for smallholders, respect the rights of local communities, and protect the environment (United Nations 2015). Sustainable agribusiness practices can help reverse the adverse trends of low productivity and environmental degradation by promoting the use of modern inputs, improving land management practices, and investing in infrastructure that supports agricultural development (Pretty et al. 2011).

Moreover, sustainable agribusiness development in SSA must consider the dualistic nature of many value chains in the region. These value chains often serve different markets, with the informal sector catering to low-income consumers and the formal sector serving high-income consumers and export markets (Tschirley et al. 2015). By upgrading informal value chains and linking them to formal ones, SSA can create more inclusive and sustainable agribusiness models that benefit a broader segment of the population (Vorley et al. 2012).

The new concept in agribusiness

Scholars have identified key determinants influencing agricultural productivity, including technology, physical and natural resources, and human capital. Human capital, in particular, plays a pivotal role in transforming these resources into actionable forms that drive business and economic growth (Ndour 2017). Agribusiness entrepreneurship integrates this concept, focusing on leveraging innovative technological capital to optimize production

while minimizing environmental impact. This managerial competency is vital for boosting productivity, especially in countries with above-average agricultural performance (Escalante et al. 2006).

The adoption of entrepreneurial concepts along agricultural value chains is linked to increased productivity and growth imperatives for small agribusiness enterprises. This necessitates the adoption of disruptive innovation frameworks and youth engagement in agriculture (Christensen and Raynor, 2003; Markides 2013; Christensen et al. 2015). In the context of Nigeria, where soil quality varies, agribusiness entrepreneurship has significant economic growth potential (Regmi and Naharki 2020). However, challenges persist, including elderly farmers' resistance to new technologies and climate change impacts (Ikuemonisan et al. 2022a).

Agribusiness entrepreneurship research is driven by the need for cutting-edge innovations to improve and sustain agricultural business (Regmi and Naharki 2020; Bairwa et al. 2014). Managerial capacity, encompassing traits such as drive, ambition, creativity, and problem solving, is crucial for launching and running successful farm and agribusiness enterprises (Bairwa et al. 2014).

The emerging trend in agribusiness involves a re-evaluation of value generation, urging companies in the agri-food industry to move beyond a manufacturing-centric role. Participants often perceive themselves as manufacturers rather than innovators, leading to a tendency to overlook the need for a sustainable business model, which is crucial for future growth. The evolving focus emphasizes a dynamic understanding of value creation, urging active involvement and innovation throughout the entire value chain. Neglecting a resilient business model is identified as a critical oversight that potentially impedes enduring growth. This shift underscores the evolving nature of agribusiness, urging firms to adopt a comprehensive and forward-thinking approach beyond traditional manufacturing roles.

Nigeria, endowed with abundant agricultural and human resources, must establish a framework conducive to agribusiness entrepreneurship, facilitating innovative and cost-effective approaches to deliver and capture value. This approach is pivotal for agribusiness entrepreneurs to play vital roles in addressing global challenges, exploring new opportunities, and adapting to evolving consumer behaviours, constituting the essence of the new deal for the agribusiness concept.

According to the Harvard Business Review, this new deal pertains to efficiently delivering traditional goods to current markets without requiring entirely novel inventions or sectors. This concept has transformative potential for distressed economies, reshaping agri-food systems and contributing significantly to economic prosperity. Embracing the new deal allows food firms to carve a distinctive niche, often involving subtle modifications that offer unique, hard-to-imitate benefits in the industry. To thrive internationally, agri-firms need an organically structured agribusiness concept capable of responsive adaptation to new inventions, a gap existing in Nigeria's current agricultural education curriculum (Ikuemonisan et al. 2022a).

Any agri-firm that wants to be relevant in the international market and grow sustainably must have an organically structured agribusiness concept that can adequately respond to new inventions on a regular basis. However, Nigeria's current agricultural education curriculum does not adequately address this issue.

Materials and methods

Study area, sampling technique, and data collection

The primary aim of this research was predominantly exploratory in nature, making it well suited for qualitative methodology (Bloomberg 2019; Corbin and Strauss, 2018; and Saunders et al. 2019). The approach to the study is qualitative, and data were gathered over a period of three months through a series of 28 in-depth interviews. Four focus group discussions (FGDs) and interviews with key informants (KIIs) were conducted in the agribusiness subsector in Nigeria. Two states were randomly selected from the north (Kano and Benue States), and two states were selected from the south (Cross River and Oyo States). Based on the given criteria of nutritional values, gender inclusiveness and participation, youth empowerment, marketability, and socioeconomic values, one agricultural crop was selected for each state. The selected crops were rice and maize for Kano State, yam and oranges for Benue State, cassava and palm oil for Cross River State, and maize and cassava for Oyo State.

Kano and Benue states in the North, along with Oyo and Cross River states in the South, were chosen for this study due to the distinct soil types that characterize these regions, which significantly influence their agricultural potential. In Nigeria, soils can generally be classified into four main categories: sandy soils in the Northern zone, lateritic soils in the interior zone, forest soils in the Southern belt, and alluvial soils (Federal Department of Forestry, 2019). The sandy soils of the Northern zone, particularly prevalent in areas like Kano, Kaduna, and Sokoto States, are primarily fine sandy loam soils. These soils are friable, easy to cultivate, and highly suitable for growing crops such as groundnuts. Additionally, in regions like the Southern Kaduna State, soils formed from local granite and loess brought by winds from the North create a fertile mix, ideal for agriculture, particularly for crops like cotton, especially in the Zaria region. These distinct soil characteristics make the selected

states representative of the broader agricultural landscapes of their respective regions. The selection of these states allows for a comprehensive understanding of the agricultural dynamics influenced by soil types, making them ideal for studying the effects of soil on crop production across different regions of Nigeria.

Major actors in the various agribusiness groups in the selected states were invited for interactions, including owners of commercial farms, agricultural exporters, participants in agricultural value chains, agricultural input dealers, agricultural service providers, smallholder farmers, farm equipment fabricators, agricultural traders, agricultural produce processors, and policymakers. The following locations were selected for interactions with stakeholders (FGDs and KIIs): Kure in the Kure Local Government Area (Kano State), Zaki Biam Yam Market in the Ukum Local Government Area (Benue State), Obubra in the Obubra Local Government Area (Cross River State), and Oke Ogun in the Oke-Ogun Local Government Area (Oyo State).

The interviews were conducted at different locations within each state.

An interview protocol, consisting of open-ended questions and probing inquiries, was developed to guide the interviews. Participants were provided with a clear definition of agribusiness entrepreneurship before the interviews to establish a common understanding.

The focus group discussions and key informant interviews aimed to gain insight into the potential role of the agricultural sector for nutritional diets and increased income generation, particularly among youth involved in agribusiness opportunities along the value chains of the selected crops. The research followed a theoretical sampling approach, initially employing purposive nonprobability sampling and then including additional cases based on their theoretical relevance. A total of 363 individuals participated in the focus group discussions, and 36 key informants, who were not part of the FGD, were interviewed separately.

The distribution of respondents by age and gender revealed that 20% were between the ages of 25 and 35, with 42% female and 58% male participants in the focus group discussions. Six participants from each state were chosen as key informants based on their level of participation in the focus group discussions.

To address objective 2, a list of global agribusiness practices and strategies for fostering sustainable agribusiness development was generated based on an extensive review of relevant literature, and journal articles, research papers, annual reports, theses, books, survey reports, and stakeholders (respondents) were asked to assess the relevance of these practices to agribusiness development. Second, an evidence-based assessment of the internal (strengths and weaknesses) and external (opportunities and threats) factors that can shape agribusiness entrepreneurship in Nigeria was conducted.

SWOT analysis framework

The SWOT analysis framework provides a structured approach to organize and analyse the data collected from stakeholders. The framework was designed to address specific research questions related to internal and external factors influencing agribusiness entrepreneurship development in Nigeria.

Data analysis

This study utilized qualitative research methods, specifically focus group interviews, to collect a substantial amount of data on the strengths, opportunities, weaknesses, and threats to the development of agribusiness in Nigeria and the 24 global agribusiness practices and strategies that were presented to the respondents during the interaction. To manage these data effectively, the analysis process followed a structured approach based on Krueger's (1994) framework analysis, supplemented by key stages from Ritchie and Spencer's (1994) framework. This combined approach offered clear steps for both novice and experienced researchers to navigate the complexity of qualitative data analysis.

The analysis process consisted of several key stages:

i. **Familiarization:** This stage involved immersing in the data by listening to tapes, reading transcripts multiple times, and reviewing observational and summary notes. The goal was to gain a comprehensive understanding of the interviews before breaking them down into parts.
ii. **Identifying a Thematic Framework:** The next step was to identify themes by writing memos in the margin of the text, capturing short phrases, ideas, or concepts emerging from the data. This process helped in developing categories and forming descriptive statements based on the research questions.
iii. **Indexing:** Data were sifted, highlighted, and sorted to extract relevant submission and make comparisons within and between cases. This stage focused on managing data by cutting and pasting similar quotes together, leading to data reduction.
iv. **Charting and Triangulation:** The extracted submissions were rearranged under appropriate thematic content. This process involved lifting submissions from the discussants' original context and organizing them based on the thematic framework developed earlier. Additionally, triangulation was adopted to compare the data obtained from the lit-

erature, informants, and discussants in the group discussion.

v. **Mapping and Interpretation:** The final stage involved interpreting the data by making sense of individual submissions and identifying relationships and links between data points. Krueger (1994) established criteria, such as words used, context, internal consistency, frequency, specificity, intensity of comments, and big ideas, to guide the interpretation process.

Reliability and validity of responses

Social sciences (SS) researchers have traditionally produced more quantitative than qualitative studies, partly due to the absence of clear, easy-to-follow guidelines for maintaining research rigor, including reliability and validity. Interestingly, most of the available measures for ensuring rigor in qualitative research originate from the natural sciences, and are frequently adopted by SS researchers. Mosbah (2024) provides practical techniques to help social science researchers maintain rigor in qualitative studies. In this study, reliability and validity were established through several critical practices. To enhance credibility, the researchers engaged in prolonged engagement with participants, allowing sufficient time to build trust and gather rich, detailed data that genuinely reflects the participants' experiences. Triangulation was employed by using multiple data sources, including interviews and observations, to cross-verify the findings, ensuring that the conclusions drawn were not based on a single method or source. Additionally, member checking was conducted by sharing preliminary findings with participants to confirm that their perspectives were accurately captured and interpreted. The research process was further validated through peer debriefing, where the findings and analysis were discussed with colleagues and experts to gain alternative insights and confirm the reliability of the interpretations.

Similarly, Henry (2015) discusses the importance of maintaining rigor in qualitative research to ensure its credibility, transferability, and dependability. The literature explores various criteria that can be applied to strengthen the quality of qualitative studies, emphasizing the need for robust methodological approaches in social science research. Henry provides an analysis of existing standards and suggests ways researchers can enhance the reliability of their qualitative work to match the expectations for rigor found in quantitative research. For transferability and dependability, the study provides thick descriptions of the research context, participants, and findings, enabling others to assess the applicability of the results to similar settings. Purposive sampling ensured that participants with specific, relevant characteristics were selected, making the findings more applicable to similar populations. To maintain dependability, an audit trail was kept, documenting every step of the research process, from data collection to analysis, allowing for the replication of the study and verification of the consistency of the findings. Confirmability was achieved through reflexivity, where the researchers acknowledged and addressed their biases, and further supported by triangulation and a detailed audit trail, ensuring that the findings were grounded in the data and not influenced by the researchers' preconceptions. These measures collectively contributed to the study's reliability and validity, making the findings trustworthy and relevant.

Following this systematic and sequential approach to data analysis, the study aimed to ensure the dependability, consistency, and conformability of the data, enhancing the overall quality and rigor of the research findings. Keeping reflective diaries, maintaining observational notes, and utilizing audiotapes or videotapes also contributed valuable dimensions to the data analysis process.

Thematic organization and reporting of findings

Table 2 shows the distribution of respondents by stakeholdership and sector activities. The findings from the SWOT analysis were thematically organized into four sections: strengths, weaknesses, opportunities, and threats, following the pattern suggested by Regmi and Naharki (2020). This thematic organization facilitated a comprehensive presentation of the research findings and allowed for a deeper exploration of each aspect of the SWOT analysis (Table 2).

Reporting findings

Table 3 presents the summarized findings of the SWOT analysis, highlighting the agreement among respondents on key research questions related to strengths, weaknesses, opportunities, and threats in agribusiness entrepreneurship development in Nigeria. The responses were obtained through a combination of FGDs and key informant interviews, ensuring a diverse range of perspectives and enhancing the credibility and applicability of the research findings.

Interpretation and discussion

The sections following Table 3 delve into the interpretation and discussion of the SWOT analysis findings. Each subsection corresponds to one of the SWOT categories (strengths, weaknesses, opportunities, and threats) and provides detailed insights derived from key informant inputs and relevant literature.

Table 2 Distribution of respondents by stakeholdership and sector activities

S/N	Sector Activity	Respondents	Frequency
1	Input Supply	Private Seed Companies;	2
		From the Crop Protection Products Market	25
		From Fertilizer Market	5
		Government Input Supply Centres	12
2	Production	Farmers without land titles	36
		Subsistence Farmers with land title (< 1 ha)	21
		Smallholders Farmers with land title (1–3 ha)	44
		Commercial Farmers with land title (> 3 ha)	5
3	Trading	Farmers' Group	18
		Wholesalers/Exporter	10
		Middlemen	18
		Retailers	22
4	Marketing/Selling	International Market	1
		National Market	10
		Regional Market	15
		Urban Market	11
		Supermarket	3
		Local Market	14
		Online Market	10
5	Service	Private	11
		Public	15
6	Prospective Trainees	Students	24
		Unemployed Graduates	31

Source: Computed from Field Survey, 2022

Results

The importance of assessing both internal (strengths and weaknesses) and external (opportunities and threats) factors is to enrich the literature on agribusiness on the one hand and to stimulate the business community for long-term scientific actions and business-oriented investment in agribusiness on the other. The pattern for thematically organizing and reporting the findings in this study is provided by Regmi and Naharki (2020). The findings of this study's SWOT analysis on Agribusiness Entrepreneurship in Nigeria are presented in four sections: Strengths, Weaknesses, Opportunities, and Threats.

SWOT analysis

Table 3 presents the agreement among respondents regarding the key research questions they were presented with. Notably, the substantial agreement and consistency observed in the responses from both the participants in the Focus Group Discussion (FGD) and the Key Informants strongly support the accuracy and broader applicability of the research findings (Flick 2014). Previous research identified four leverage points—strength, weakness, opportunities, and threats—as well as associated research questions. The respondents were allowed to make subtle comments to the questions in Table 3 based on their experiences in their respective local agribusiness environments. To capture the diversity of perspectives and reach thematic saturation, this study focuses on the prevalence of certain opinions among participants, reflecting the broader population of actors in Nigeria's agricultural value chain. For an opinion to be considered representative of the majority of the study population (agribusiness actors), the study establishes a threshold: at least 80% of the 363 participants, along with concurrence from the 36 Key Informants, must share the same opinion. This threshold serves as a practical measure to ensure that the majority opinion represents a strong and collective perspective within the studied population. Nonetheless, to further gauge the level of consensus, participants were asked to respond to the following questions: "Will you accept the decision?" "Will you live with the decision?" "Do you fully agree with the decision, support it, and not obstruct it?". Only opinions that meet the following conditions will be considered in this report: all parties agree with the proposed decision and are committed to carrying it out; no one will block or obstruct the decision or its implementation; and everyone will

Table 3 SWOT analysis

Strength	Weakness
i. What competitive advantage (strength) does Nigeria have over other countries in Agribusiness Entrepreneurship? ii. What is the current state of the institutional framework (strength) in Nigeria for achieving competitive and sustainable agricultural value chains?	i. What characteristics (weaknesses) are impeding agribusiness entrepreneurship in Nigeria? ii. In which area (of weakness) does Nigeria need to improve in order to boost agricultural productivity?
• 43.3 million hectares of agricultural land spread across complementary agro ecological zones to support massive agricultural production • Enormous, energetic, ingenious, active, and mobile youth population (54%) with a projected population of 262 million in 2050 • Potential for growth and stability as a member of N-11 countries • Indigenous and traditional knowledge • Plant Biodiversity influenced by enormous anthropogenic forces and floral diversity (A function of Organic residues) • Plant Biodiversity influenced by enormous anthropogenic forces and floral diversity (A function of Organic residues) Government institutions are available to develop the agribusiness subsector through various government agencies such as the Ministry of Agriculture, the Ministry of Commerce and Industry, the Central Bank of Nigeria, Small, and Medium Development Agency (SMEDAN) • Institutional Policy Framework for Managing Risk in Agriculture	• The upstream sector is dominated by traditional agricultural actors • Low penetration (adoption) of technology and, as a result, low productivity • Farm mechanization is hampered by difficult farm landscape terrain • Inadequate technological solutions to agricultural and related issues • General perception of agricultural drudgery • Lack of understanding and incentives to start an agribusiness a general perception of agricultural drudgery • Lack of understanding and incentives to start an agribusiness • Lack of infrastructure (storage, transport, etc.) • Postharvest losses and agricultural products with low added value • Inadequate education and information on export management and international agribusiness; • Inadequate education and information on export management and international agribusiness; • Insufficient access to quality data for making informed agribusiness decisions • Weak judicial system • Agribusiness corridor that is unorganized and unregulated agribusiness corridor
Opportunities i. What agricultural produce/products from Nigeria are increasingly in demand in both the domestic and international markets (opportunities)? ii. Does Nigeria have the capacity to sustain a consistent increase in agricultural production while maintaining a competitive advantage (opportunity for expansion)?	Threats i. Is there any risk or difficulty in exploring these agribusiness opportunities in Nigeria? i. ii. What factors/issues are causing people to miss out on agribusiness opportunities?
• Commercial production of cassava, yam, cocoyam, cereals, cocoa, plantains, oil palm, and agricultural products (Comparative Advantage) • Agrotourism destinations, both natural and man-made • Significant domestic and international market (free trade) • Good bilateral relationships that can aid in the promotion of agribusiness • Institutions of higher learning where improved and market-driven agribusiness entrepreneurship and other related courses can be taught • Agriculture research institutes that promote new agricultural innovations • Enormous amounts of foreign exchange from crude oil can be used to fund agricultural research institutes and new agribusiness innovations • Increasing international organization support, such as CIDA, FAO, World Bank, AfDB, and others • Growing opportunity for virtual businesses	• Insecurity and recurring conflicts • Low insurance uptake by actors in agricultural value chains as a result of social stigma and insufficient motivation • Skill gaps, particularly in the development of new products and modern marketing strategies • Education in modern agriculture and agribusiness is of poor quality • Lack of adaptable and inclusive industry-linked pedagogy to train the next generation of competitive agribusiness entrepreneurs • Ineffective climate change management strategies • Lack of irrigation infrastructure Deforestation Pests and diseases • There is an overemphasis on the upstream sector, with little or no attention given to the midstream and downstream agribusiness sectors • Lack of knowledge about export buses; industrial expansion; and a lack of start-up capital

Source: Compiled from Field Survey, 2022

support and help implement the decision. Table 4 provides a summary of the responses.

Strengths

Climate suitability and agricultural land suitability in Nigeria According to Table 4, more than 80% of the participants agree that Nigeria has significant potential for agricultural growth, supported by 43.3 million hectares of land across diverse agro-ecological zones, which can facilitate large-scale agricultural production. The country also boasts of a dynamic and youthful population, which constitutes 54% of its total population and is projected to reach 262 million by 2050. This demographic is crucial for driving innovation and productivity in the agribusiness sector. Additionally, Nigeria's membership in the N-11 countries positions it for potential economic growth and stability.

Furthermore, the nation benefits from rich plant biodiversity, influenced by organic residues and traditional knowledge, which can be leveraged for sustainable agricultural practices. Government institutions and agencies, such as the Ministry of Agriculture and the Central

Table 4 Respondents' consensus of the assessment of strategies for sustainable agribusiness development in Nigeria

S/N	Strategies	Approach	To be facilitated by
1	A favourable macro-policy environment must be created	Appropriate monetary and fiscal policies to stabilize the value of the domestic currency	Central Bank of Nigeria
2	Declare and follow food safety and market supply consistency	Marketing Freedom to show its support and commitment to the liberalization policy	Government and her agencies
3	Increase human capacity for agricultural development	A framework for the facilitation of a consistent business and technical training assistance programme to scale up the required skills for actors along agricultural value chains	Public Sector and Private Sectors
4	Increase access to credit and insurance	Access to finance and insurance for the development of agribusiness through a financial market in which agro-actors have high accessibility and penetration of finance outlets into rural areas	Finance Institutions
5	Quality assurance for the supplied input	Low-quality input and output must be checked on a regular basis. As a result, quality control and anti-monopoly measures are unavoidable for a well-functioning agriculture industry	Public Sector. Functioning Regulatory System
6	Transparency should be promoted in the agribusiness industry	An MIS should be created to collect, analyse, and disseminate information about prices, deliveries, and stock levels at various locations	Public Sector: Functioning Regulatory System
7	Increase research capacity for the promotion of private agro-companies, and Promote Technology Transfer activities	Because modern agriculture is science-based, research institutes, universities, vocational centers, and so on must be strengthened, and industry-linked pedagogy developed	Public & Private Sectors through NUC & NBTE

Source: Author's Compilation, 2022

Bank of Nigeria, provide a robust institutional framework to support agribusiness development. These institutions play a crucial role in managing risks in agriculture and promoting the growth of the agribusiness subsector.

The consensus among the participants is that the strengths in Nigeria's agribusiness landscape, such as climate suitability, agricultural land suitability, agro-ecological niches, rich plant biodiversity, government prioritization of the sector, and the institutional policy framework, are intricately connected to broader challenges and opportunities within the country's agribusiness sector. Therefore, integrating these findings with the theoretical frameworks of Krueger (1994) and Ritchie & Spencer (1994) can provide a deeper analysis of these connections.

Nigeria has a strong advantage in terms of climate suitability and agricultural land suitability. The country's diverse climatic regions provide favourable conditions for growing a wide range of crops, giving Nigeria a comparative advantage in farming. This diversity also attracts immigrants to the country. However, despite these advantages, Nigeria's agricultural productivity is currently low, indicating the underutilization of agricultural factors such as land and capital. This low productivity is attributed to factors such as the lack of mechanized agricultural systems and low technological adoption. Overall, Nigeria's climate suitability and diverse agricultural land offer great potential for farming, but there is a need to address the challenges that hinder productivity (Poudel 2016; USDA-Economic Research Services: International Agricultural Productivity 2022).

Nigeria also possesses rich plant biodiversity, which presents business potential due to the combination of species and ecologies. Although plant diversity in Nigeria is not fully known, the country is home to a wide range of bird species, reptiles, amphibians, and fish species. Nigeria accounts for only 0.7% of the Earth's surface area, but it has diverse biodiversity and ecology, with over 900 bird species, 135 reptile species, 109 amphibian species, and 648 fish species (Altiparmak 2022). Nigeria's biodiversity is unique and has high business potential due to the combination of species and ecologies (Luiselli 2003 and Ugochukwu 2008).

The agro-ecological niches in Nigeria's different climatic zones offer opportunities for specific commodity production and agribusiness. The types of crops and animals raised in each region are determined by Nigeria's agroecological niche. Different ecological zones have their own specific commodities and potential for agribusiness entrepreneurship. Modern innovations in the value chains of these crops can enhance agribusiness opportunities for young entrepreneurs. For example, the savanna zone is suitable for crops such as cowpeas and soybeans, while the drier Sahel and Sudan savanna zones

are suitable for drought-tolerant crops such as corn, groundnut, sorghum, and millet. The climatic belt of the savanna zone is also known to be the natural habitat for various tree species. The concept of thematic frameworks is used to categorize crops and livestock based on their suitability for different ecological zones. Integrating modern innovations along these value chains aligns with an entrepreneurial approach, encouraging farmers to adopt innovative practices and enhance productivity.

The concept of thematic frameworks, as outlined by Krueger (1994), was applied here to categorize crops and livestock based on their suitability to different ecological zones. For instance, crops such as maize and rice thrive in monsoon regions, while millet and sorghum are more suitable for drier savanna zones. Integrating modern innovations along these value chains aligns with the entrepreneurial approach advocated by both frameworks, encouraging farmers to adopt innovative practices and enhance productivity.

The government's prioritization of the agricultural sector, as highlighted in the study, reflects a strategic shift towards commercialized agriculture and holistic agricultural development. This aligns with Krueger's framework, emphasizing the role of external factors such as government policies in shaping business environments. The Agricultural Promotion Policy (APP) serves as a roadmap for increasing agricultural input and output, fostering local and global market competitiveness, and promoting entrepreneurship within the sector.

The state of the agri-food system in Nigeria has undergone transformation in recent years due to factors such as population growth, urbanization, environmental consciousness, and changing occupational profiles. The government plays a crucial role in ensuring consistent production and food supply through interventions such as the supply of certified seeds, fertilizers, and funds for agricultural value chains. To manage agricultural risk, the Nigerian government has implemented institutional policies such as the Nigeria Agricultural Insurance Corporation (NAIC), which provides indemnity to farmers and covers a wide range of commodities. Premium subsidies are available for most agricultural insurance funded by federal and state governments.

In terms of future prospects, the demand for agricultural products in Nigeria is expected to be influenced by agro-industrial demands, increased food demand driven by population growth and rising income.

Weaknesses

All the participants agreed that Nigeria's upstream agricultural sector faces several challenges that hinder its productivity and growth. The sector is dominated by traditional agricultural practices, with low adoption of technology, leading to low productivity. Farm mechanization is difficult due to challenging terrain, and there are inadequate technological solutions for agricultural issues. The general perception of agriculture as laborious and unattractive further discourages participation in agribusiness.

Additionally, participants opined that there is a lack of infrastructure, such as storage and transportation, which contributes to significant postharvest losses and low-value-added agricultural products. The sector suffers from insufficient education and information on export management and international agribusiness, as well as limited access to quality data for informed decision-making. An unorganized and unregulated agribusiness corridor and a weak judicial system further complicate efforts to improve the sector.

The weaknesses identified in agribusiness entrepreneurship in Nigeria are intertwined with several dimensions, including land holding, infrastructure, competitiveness, trade, research and development, knowledge transfer, and a weak justice system. The decline in per capita land holdings over time reflects a reduction in agricultural land availability, influenced by various socioeconomic, cultural, and political factors. These complexities hinder the development of agribusiness in Nigeria, as supported by Oluwatayo et al. (2019) and other scholars who cite environmental degradation as a significant threat to agricultural productivity.

Furthermore, high overhead costs due to inadequate power supply and limited access to cheap energy sources were highlighted as concerns by respondents. This issue is exacerbated by the lack of implementation of smart energy solutions in rural areas, which impacts the sustainability of agro-ecosystems. Integrating these findings with the theoretical framework underscores the challenges faced in agribusiness development in Nigeria, particularly in terms of land availability, infrastructure, and energy sustainability. Addressing these weaknesses is crucial for enhancing the competitiveness and sustainability of agribusiness ventures in the country.

Opportunities

Pre-farm (input), farm and post-farm (processing) and marketing segments Majority of the participants (93%) submitted that Nigeria has a strong comparative advantage in the commercial production of various agricultural products, including cassava, yam, cocoa, cereals, plantains, and oil palm. The country also has potential in agrotourism, with both natural and man-made destinations. Nigeria's significant domestic and international markets, supported by good bilateral relationships and free trade, further enhance the prospects for agribusiness.

Additionally, institutions of higher learning and agricultural research institutes in Nigeria contribute to the development of market-driven agribusiness entrepreneurship and the promotion of new agricultural innovations. The country's substantial foreign exchange earnings from crude oil provide a financial resource for funding these research initiatives. Growing support from international organizations like CIDA, FAO, the World Bank, and the AfDB, along with the increasing opportunities for virtual businesses, further bolster the potential for agribusiness growth in Nigeria.

The opportunities identified in Nigeria's agriculture sector align with broader agribusiness challenges and prospects. The sector offers avenues for business expansion, rural employment, income improvement, and poverty reduction if a new orientation emphasizing a favourable business climate is adopted (FAO 2022). However, existing agricultural structures and programs lack integration with national goals, leading to a decline in employment within the sector and heavy reliance on agricultural imports due to low productivity among subsistence farmers (Cohen et al., 2019; Dzimba and van der Poll 2022).

The theoretical framework supports these findings by highlighting the importance of productivity-driven innovations and efficient production and supply chains in enhancing agricultural output and job creation (Krueger 1994). Integrating the results with the theoretical framework underscores the need for agribusiness entrepreneurs to focus on producing crops in which Nigeria has a comparative advantage, such as wheat, sugar, fish, milk, sesame, cashew nuts, cocoa beans, ginger, frozen shrimp, and cotton (Ritchie & Spencer 1994). Optimizing resource use, including labour and land, is crucial for achieving increased productivity and competitiveness in the global agricultural market (FAO 2022).

Furthermore, FAOSTAT data indicate that Nigeria has the potential to become a major player in trading various crops globally, including roots and tubers, cassava, yams, cereals, vegetables, fruits, oil palm, maize, and sorghum (FAO 2022). However, this can only be realized through the adoption of productivity-driven innovations and efficient resource utilization across agricultural value chains (Krueger 1994). Addressing these opportunities in line with the theoretical framework can contribute significantly to overcoming agribusiness challenges and harnessing Nigeria's agricultural potential.

Agrotourism The potential of agrotourism in Nigeria intersects with broader agribusiness challenges and opportunities, offering a promising avenue for economic growth and development. Scholars and industry experts have highlighted Nigeria's substantial economic potential from agrotourism (Nnadi and Akwiwu 2005; Khidir 2020). This perspective suggests that leveraging the tourism sector could address the economic challenges faced by Nigeria and its citizens (Adebayo and Butcher, 2022; Banki and Ismail 2015).

Khidir (2020) defines agrotourism as a platform for encouraging engagement in agricultural activities and fostering physical development. Data from the Bureau of Statistics indicate that the contribution of the tourism sector to Nigeria's aggregate gross domestic product fluctuated between 2.8 and 4.5% between 2019 and 2020. As of 2021, it stood at 3.6%, and the buck of this this came from travel tourism. According to entrepreneurs in this sector, the conversation is still about how to help the government create an enabling environment so that doing business in the sector is easier. This call is based on the fact that agrotourism can be used to boost the branding of local, organic, and traditional products, as well as the development of rural entrepreneurship and the creation of job opportunities in many rural areas, where rural unemployment is expected to reach 33% by 2022.

Threats

Approximately 98% of the respondents aligned with the fact that Nigeria's agribusiness sector faces significant challenges, including insecurity and recurring conflicts, which undermine stability. Low insurance uptake in agricultural value chains, driven by social stigma and lack of motivation, leaves actors vulnerable. The sector also suffers from skill gaps, particularly in product development and modern marketing, compounded by poor-quality education in modern agriculture and agribusiness. The lack of industry-linked pedagogy hampers the training of future agribusiness entrepreneurs.

Additionally, ineffective climate change management, inadequate irrigation infrastructure, deforestation, and pests and diseases further threaten agricultural productivity. The sector is overly focused on upstream activities, neglecting the midstream and downstream aspects of agribusiness. There is also a lack of knowledge about export opportunities, industrial expansion, and insufficient start-up capital, which hinders growth and development.

Agribusiness entrepreneurs in Nigeria encounter a myriad of challenges that intersect with broader economic and environmental issues, particularly prevalent in sub-Saharan Africa. Climate change poses a significant challenge to agricultural productivity and sustainability (Ogidi 2014; Raimi et al. 2021; Pratt et al. 2022). Additionally, the government's failure to establish an enabling business environment hinders entrepreneurship and economic growth (Regmi and Naharki, 2020).

Unorganized trade practices, price fraud, and market volatility further complicate agribusiness operations (Ikuemonisan et al. 2022a, b). These challenges contribute to a stagnant skilled migration rate, as professionals hesitate to seek opportunities abroad due to uncertainties and limitations within the domestic agribusiness landscape, thereby exacerbating the risk of brain drain.

In light of these challenges, agribusiness entrepreneurs in Nigeria must navigate complex operating environments while also capitalizing on emerging opportunities. Integrating findings with theoretical frameworks can provide insights into strategies for mitigating challenges and leveraging opportunities for sustainable agribusiness development.

Respondents' consensus to strategies for sustainable agribusiness development

Table 4 presents a detailed assessment of agribusiness development strategies in Nigeria, highlighting a strong consensus among stakeholders regarding the urgent need for enhancing the agricultural industry (AI) through a comprehensive approach. This collective recognition underscores the vital importance of significant improvements in Nigeria's agri-food system to achieve efficiency and sustainability.

The theoretical framework supports these findings by emphasizing the role of government intervention, particularly through liberalization measures, in creating an enabling environment for sustainable agribusiness development (Chao et al. 2022). Liberalization, involving market opening, reduced trade barriers, and increased competition, is seen as essential for fostering efficiency and sustainability in Nigeria's agri-food system.

Table 4 further outlines sustainable strategies that have garnered widespread agreement, with over 80% of stakeholders expressing consensus on these approaches. The consensus reaching processing (CRP) methodology, as developed by Chao et al. (2022), was employed to determine the levels of consensus among respondents. Out of the 24 global agribusiness practices and strategies that were presented to the respondents during the interaction, only seven reported consensus levels of 80% and above.

These strategies, which have received increasing support from stakeholders, serve as key pillars for fostering sustainable agribusiness development in Nigeria. They represent a shared vision among stakeholders and provide a roadmap for policymakers and industry players to prioritize and implement to propel the nation's agribusiness sector towards a more sustainable and efficient future.

The findings from the survey among stakeholders in Nigeria's agribusiness industry reveal key strategies and approaches crucial for fostering sustainable development. These findings align with broader agribusiness challenges and opportunities in Nigeria and are supported by theoretical frameworks from the relevant literature.

A supportive macropolicy environment is identified by 96% of stakeholders as essential. This aligns with the literature emphasizing the need for strengthened agribusiness development capacity in sub-Saharan Africa (Babu et al. 2016). The Central Bank of Nigeria is recognized as a key facilitator for implementing this strategy.

Strict compliance with regulations for food safety and market supply consistency is stressed by approximately 82% of stakeholders. Balancing regulations and market freedom is highlighted in the literature as positively impacting market competition and economic growth (Gould et al. 1996; Nicoletti and Scarpetta 2003). The government is seen as the facilitator for ensuring adherence to rules.

Third, enhancing human capacity for agricultural development is emphasized by approximately 89% of stakeholders. Investments in human capital are known to significantly contribute to increased agricultural productivity (Davis et al. 2021). Both the public and private sectors are recognized as facilitators, although issues of incompetence within the government system are noted (Dzimba and van der Poll 2022; Kineber et al. 2023).

All stakeholders (100%) highlighted the need for increased access to credit and insurance facilities, which are positively associated with higher agricultural productivity and economic growth (Phiri et al. 2022; Demirgüç-Kunt et al., 2017). Collaboration between the government and financial institutions is crucial for facilitating this strategy.

Close to 99% of stakeholders emphasize quality assurance in input supply, recommending quality control measures and antimonopoly regulations (Klerkx and Begemann 2017). The public sector is identified as the facilitator of this strategy.

Additionally, more than 90% of stakeholders support transparency promotion in the agribusiness industry, aligning with the World Bank's proposal for a Management Information System (MIS) (Awotide et al. 2015). The public sector, particularly the functioning regulatory system, is recognized as the facilitator.

More than 85% of stakeholders support strategies focusing on research capacity and technology transfer activities in private agro-companies. The literature supports this, linking investments in research and development to increased agricultural productivity (Alene et al. 2013; Graziano da Silva et al. 2019). The National Universities Commission (NUC) and the National Board for Technical Education (NBTE) are identified as facilitators of both the public and private sectors.

Discussion

The consensus among the participants is that the strengths in Nigeria's agribusiness landscape, such as climate suitability, agricultural land suitability, agro-ecological niches, rich plant biodiversity, government prioritization of the sector, and the institutional policy framework, are intricately connected to broader challenges and opportunities within the country's agribusiness sector. Therefore, integrating these findings with the theoretical frameworks of Krueger (1994) and Ritchie and Spencer (1994) can provide a deeper analysis of these connections.

Nigeria has a strong advantage in terms of climate suitability and agricultural land suitability. The country's diverse climatic regions provide favourable conditions for growing a wide range of crops, giving Nigeria a comparative advantage in farming. This diversity also attracts immigrants to the country. However, despite these advantages, Nigeria's agricultural productivity is currently low, indicating the underutilization of agricultural factors such as land and capital. This low productivity is attributed to factors such as the lack of mechanized agricultural systems and low technological adoption. Overall, Nigeria's climate suitability and diverse agricultural land offer great potential for farming, but there is a need to address the challenges that hinder productivity (Poudel 2016; USDA-Economic Research Services: International Agricultural Productivity 2022).

Nigeria also possesses rich plant biodiversity, which presents business potential due to the combination of species and ecologies. Although plant diversity in Nigeria is not fully known, the country is home to a wide range of bird species, reptiles, amphibians, and fish species. Nigeria accounts for only 0.7% of the Earth's surface area, but it has diverse biodiversity and ecology, with over 900 bird species, 135 reptile species, 109 amphibian species, and 648 fish species (Altiparmak 2022). Nigeria's biodiversity is unique and has high business potential due to the combination of species and ecologies (Luiselli 2003 and Ugochukwu 2008).

The agro-ecological niches in Nigeria's different climatic zones offer opportunities for specific commodity production and agribusiness. The types of crops and animals raised in each region are determined by Nigeria's agroecological niche. Different ecological zones have their own specific commodities and potential for agribusiness entrepreneurship. Modern innovations in the value chains of these crops can enhance agribusiness opportunities for young entrepreneurs. For example, the savanna zone is suitable for crops such as cowpeas and soybeans, while the drier Sahel and Sudan savanna zones are suitable for drought-tolerant crops such as corn, groundnut, sorghum, and millet. The climatic belt of the savanna zone is also known to be the natural habitat for various tree species. The concept of thematic frameworks is used to categorize crops and livestock based on their suitability for different ecological zones. Integrating modern innovations along these value chains aligns with an entrepreneurial approach, encouraging farmers to adopt innovative practices and enhance productivity.

The concept of thematic frameworks, as outlined by Krueger (1994), was applied here to categorize crops and livestock based on their suitability to different ecological zones. For instance, crops such as maize and rice thrive in monsoon regions, while millet and sorghum are more suitable for drier savanna zones. Integrating modern innovations along these value chains aligns with the entrepreneurial approach advocated by both frameworks, encouraging farmers to adopt innovative practices and enhance productivity.

The government's prioritization of the agricultural sector, as highlighted in the study, reflects a strategic shift towards commercialized agriculture and holistic agricultural development. This aligns with Krueger's framework, emphasizing the role of external factors such as government policies in shaping business environments. The Agricultural Promotion Policy (APP) serves as a roadmap for increasing agricultural input and output, fostering local and global market competitiveness, and promoting entrepreneurship within the sector.

The state of the agri-food system in Nigeria has undergone transformation in recent years due to factors such as population growth, urbanization, environmental consciousness, and changing occupational profiles. The government plays a crucial role in ensuring consistent production and food supply through interventions such as the supply of certified seeds, fertilizers, and funds for agricultural value chains. To manage agricultural risk, the Nigerian government has implemented institutional policies such as the Nigeria Agricultural Insurance Corporation (NAIC), which provides indemnity to farmers and covers a wide range of commodities. Premium subsidies are available for most agricultural insurance funded by federal and state governments.

In terms of future prospects, the demand for agricultural products in Nigeria is expected to be influenced by agro-industrial demands, increased food demand driven by population growth and rising income.

The weaknesses identified in agribusiness entrepreneurship in Nigeria are intertwined with several dimensions, including land holding, infrastructure, competitiveness, trade, research and development, knowledge transfer, and a weak justice system. The decline in per capita land holdings over time reflects a reduction in agricultural land availability, influenced by various socioeconomic, cultural, and political factors.

These complexities hinder the development of agribusiness in Nigeria, as supported by Oluwatayo et al. (2019) and other scholars who cite environmental degradation as a significant threat to agricultural productivity.

Furthermore, high overhead costs due to inadequate power supply and limited access to cheap energy sources were highlighted as concerns by respondents. This issue is exacerbated by the lack of implementation of smart energy solutions in rural areas, which impacts the sustainability of agro-ecosystems. Integrating these findings with the theoretical framework underscores the challenges faced in agribusiness development in Nigeria, particularly in terms of land availability, infrastructure, and energy sustainability. Addressing these weaknesses is crucial for enhancing the competitiveness and sustainability of agribusiness ventures in the country.

The opportunities identified in Nigeria's agriculture sector align with broader agribusiness challenges and prospects. The sector offers avenues for business expansion, rural employment, income improvement, and poverty reduction if a new orientation emphasizing a favourable business climate is adopted (FAO 2022). However, existing agricultural structures and programs lack integration with national goals, leading to a decline in employment within the sector and heavy reliance on agricultural imports due to low productivity among subsistence farmers (Cohen et al., 2019; Dzimba & van der Poll 2022).

The theoretical framework supports these findings by highlighting the importance of productivity-driven innovations and efficient production and supply chains in enhancing agricultural output and job creation (Krueger 1994). Integrating the results with the theoretical framework underscores the need for agribusiness entrepreneurs to focus on producing crops in which Nigeria has a comparative advantage, such as wheat, sugar, fish, milk, sesame, cashew nuts, cocoa beans, ginger, frozen shrimp, and cotton (Ritchie & Spencer 1994). Optimizing resource use, including labour and land, is crucial for achieving increased productivity and competitiveness in the global agricultural market (FAO 2022).

Furthermore, FAOSTAT data indicate that Nigeria has the potential to become a major player in trading various crops globally, including roots and tubers, cassava, yams, cereals, vegetables, fruits, oil palm, maize, and sorghum (FAO, 2022). However, this can only be realized through the adoption of productivity-driven innovations and efficient resource utilization across agricultural value chains (Krueger 1994). Addressing these opportunities in line with the theoretical framework can contribute significantly to overcoming agribusiness challenges and harnessing Nigeria's agricultural potential.

The potential of agrotourism in Nigeria intersects with broader agribusiness challenges and opportunities, offering a promising avenue for economic growth and development. Scholars and industry experts have highlighted Nigeria's substantial economic potential from agrotourism (Nnadi and Akwiwu 2005; Khidir 2020). This perspective suggests that leveraging the tourism sector could address the economic challenges faced by Nigeria and its citizens (Adebayo and Butcher, 2022; Banki and Ismail 2015).

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Concerning the threats to agribusiness development in Nigeria, participants opined that agribusiness entrepreneurs in Nigeria encounter a myriad of challenges that intersect with broader economic and environmental issues, particularly prevalent in sub-Saharan Africa. Climate change poses a significant challenge to agricultural productivity and sustainability (Ogidi 2014; Raimi et al. 2021; Pratt et al. 2022). Additionally, the government's failure to establish an enabling business environment hinders entrepreneurship and economic growth (Regmi and Naharki, 2020).

Unorganized trade practices, price fraud, and market volatility further complicate agribusiness operations (Ikuemonisan et al. 2022a, b). These challenges contribute to a stagnant skilled migration rate, as professionals hesitate to seek opportunities abroad due to uncertainties and limitations within the domestic agribusiness landscape, thereby exacerbating the risk of brain drain.

In light of these challenges, agribusiness entrepreneurs in Nigeria must navigate complex operating environments while also capitalizing on emerging opportunities. Integrating findings with theoretical frameworks can provide insights into strategies for mitigating challenges and leveraging opportunities for sustainable agribusiness development.

The findings of this study both align with and expand upon the literature on agribusiness in Nigeria. The

identification of strengths such as extensive agricultural land, a youthful population, indigenous knowledge, and supportive government institutions resonates with previous studies highlighting Nigeria's considerable potential in agribusiness (Babu et al. 2016). These findings reinforce the understanding that Nigeria possesses the natural and human resources necessary for a thriving agribusiness sector.

However, the study also sheds light on critical weaknesses, including low technology adoption, infrastructure challenges, educational gaps, and a weak judicial system, which are noted as areas requiring significant improvement (Watson and Winfree 2022). This nuanced analysis expands the current understanding by emphasizing the specific barriers and limitations that hinder the full realization of Nigeria's agribusiness potential. This finding challenges the notion that resources alone are sufficient for success and underscores the importance of addressing systemic challenges for sustainable growth.

Moreover, the study's identification of promising opportunities such as commercial crop production, agrotourism, foreign investments, research institutions, and virtual business prospects aligns with observations from the World Bank and other literature (World Bank, 2018). This alignment reinforces existing knowledge about the diverse opportunities present in Nigeria's agribusiness landscape and highlights areas where targeted interventions can yield significant returns.

In contrast, the study's discussion of threats such as insecurity, insurance gaps, skill deficiencies, climate change impacts, and limited knowledge about export opportunities offers a sobering contrast to the optimistic outlook on Nigeria's agribusiness potential. These identified threats challenge the narrative of unchecked growth and underscore the need for strategic risk management and capacity-building efforts within the sector.

Majority of the participants in the in-depth discussion submitted that to address the challenges faced by Nigerian agribusiness entrepreneurs, several strategies need to be considered. First, there is a need for targeted capacity-building programmes that equip farmers with the necessary skills and knowledge to engage in entrepreneurial activities. These programmes should focus on both technical agricultural skills and business management competencies, ensuring that farmers are prepared for the dual challenges of sustainability and liberalization.

Second, the development of supportive infrastructure, such as transportation networks and market access points, is crucial for enabling entrepreneurial activities in the agricultural sector. Improving access to finance through innovative financing mechanisms, such as microfinance and agricultural insurance, can also play a critical role in supporting agribusiness entrepreneurship.

Third, policy interventions are needed to create an enabling environment for sustainable agriculture. This includes the provision of incentives for the adoption of sustainable practices, as well as the development of regulatory frameworks that support innovation and entrepreneurship in the agricultural sector. The Nigerian government, in collaboration with international partners, can play a pivotal role in driving these policy changes.

This study's proposed sustainable strategies, supported by stakeholder consensus and aligned with theoretical frameworks, contribute significantly to the discourse on agribusiness development in Nigeria. By emphasizing the importance of a favourable macro-policy environment, food safety, human capacity development, financial access, quality control, transparency, and research, this study offers a comprehensive roadmap for addressing challenges and leveraging opportunities.

Limitations

The study primarily relied on secondary data and may have limited the depth of analysis on specific regional challenges and local variations within Nigeria. Additionally, the research did not fully explore the impact of global market dynamics on Nigeria's agribusiness sector.

Future research directions

Future research should focus on in-depth case studies of specific agribusiness sub-sectors, particularly those with high export potential. There is also a need to explore the role of technology adoption in overcoming the identified weaknesses and threats. Furthermore, studies that investigate the effectiveness of current government policies and propose new frameworks for risk management and infrastructural development in agribusiness would be valuable.

Conclusions

The study on Nigeria's agribusiness entrepreneurship identified significant competitive advantages, such as vast agricultural land, a youthful population, rich biodiversity, and government support through various institutions. These strengths create a solid foundation for developing a sustainable and competitive agribusiness sector. However, the study also noted that the effectiveness of Nigeria's institutional framework is limited by low technology adoption and inadequate infrastructure, which hinders the development of sustainable agricultural value chains. On the other hand, several weaknesses were highlighted, including the prevalence of traditional farming methods, low technology penetration, and poor farm mechanization. The perception of agriculture as unattractive and the lack of education on agribusiness further impede growth. Despite these challenges, Nigeria has significant

opportunities in both domestic and international markets, particularly in crops like cassava, yam, cereals, and cocoa. The study also identified threats such as insecurity, climate change, and skill gaps that pose risks to the sector's potential. Addressing these weaknesses and threats is crucial for Nigeria to fully leverage its opportunities and strengthen its agribusiness sector. Conclusively, this study provides a nuanced analysis of Nigeria's agribusiness landscape, expanding the existing knowledge while challenging some prevailing assumptions. The emphasis on collaborative efforts between the public and private sectors to create an enabling environment further enriches the discourse and underscores the potential for Nigeria's agribusiness sector to drive economic growth, food security, and environmental sustainability.

Recommendations

To address these challenges and leverage opportunities, this study proposes seven sustainable strategies with strong stakeholder consensus. These strategies include creating a favourable macro-policy environment, implementing checks on food safety and market supply consistency, liberalizing policies, enhancing human capacity, increasing access to finance and insurance, implementing quality control measures, establishing a functioning Management Information System (MIS), and boosting research capacity for technology transfer activities.

On the other hand, threats such as insecurity, insurance gaps, skill deficiencies, climate change impacts, and limited knowledge about export opportunities present challenges that need to be addressed to ensure the sector's resilience and growth.

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Author contributions
My contributions to this research are as follows: conceptualization; methodology; validation; investigation; resources; data curation; writing—original draft preparation; writing; review and editing; visualization.; supervision; project administration; self-funding, I have read and agreed to the published version of the manuscript.

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The data presented in this study are available on request from the Department of Agricultural Economics, Adekunle Ajasin University, Akungba Akoko.

Declarations

Competing interests
The author declares no conflict of interest.

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