# Examining the impact of entrepreneurial psychology on agribusiness sustainability

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## Abstract

**Purpose:** This study investigates the relationship between entrepreneurial Cognition (EC), entrepreneurial subjective norms (ESN), entrepreneurial self-efficacy (ESE), and entrepreneurial Innovation Capability (EIC) on agribusiness sustainability (AS) in North-Central Nigeria.

**Design/methodology/approach:** Adopting a cross-sectional survey of 340 agro-processing firms, collected data were analyzed using Partial Least Square Structural Equation Modelling (PLS-SEM).

**Findings:** Results revealed that EC and ESN exerted significant positive effects on agribusiness sustainability, while EIC served as a partial mediator between the constructs and AS. Furthermore, EC, ESE, and ESN significantly predicted EIC, indicating that innovation capability is largely shaped by entrepreneurs' networks and competencies. Indirect effect analysis confirmed that EIC significantly mediates the relationships between EC, ESE, ESN, and AS.

**Limitations and Research implications:** This study only examines the impact of entrepreneurial psychology on agribusiness sustainability in North Central Nigeria, caution should be exercised when generalizing the findings.

**Practical Implications:** The study findings practically imply that enhancing entrepreneurial psychology strengthens agribusiness sustainability outcomes, hence recommends that targeted agribusiness capacity programs should be aimed at boosting entrepreneurial innovation capability to increase the sustainability of agribusinesses in North Central Nigeria.

**Originality/value:** The findings from the PLS-SEM analysis demonstrate a statistically significant and positive relationship between entrepreneurial factors and agribusiness sustainability in North Central Nigeria.

**Keywords:** Entrepreneurial Psychology, Entrepreneurial Innovation Capability, Entrepreneurial Self-efficacy, Entrepreneurial Cognition, Agribusiness Sustainability.

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## Introduction

Agribusiness is globally recognized as a critical engine of economic growth, structural transformation, and socio-economic development, contributing nearly one-third of global GDP and employing over 1.3 billion people across farming, processing, logistics, and marketing activities (Food and Agriculture Organization, 2021). In both developed and emerging economies, agribusiness is increasingly structured as an integrated value chain that not only ensures food security but also stimulates job creation, technological innovation, and economic diversification (Hidayati et al., 2021). In many Asian economies such as Vietnam,


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India, and Indonesia, the transition from primary agricultural production to agro-processing and value addition has significantly enhanced competitiveness, reduced post-harvest losses, and strengthened global market integration (Bharatkumar et al., 2023; Sharma & Kumadvancement Agro-processing firms are the pillars behind this transformation, reducing after harvest losses and impacting industrial growth, and connecting rural producers to urban markets and international demands (Thapa & Shrestha, 2019). The success of those firms demonstrated that agribusinesses could serve as both a cushion against food insecurity and a catalyst for economic growth.



Agribusinesses in sub-Saharan Africa contribute approximately 23-25% of GDP and provide livelihoods for almost 60% of the population (Senbet & Simbanegavi, 2017). Despite this contribution, the region remains constrained by structural challenges such as inadequate infrastructure, limited credit facilities, high energy costs, and underdeveloped processing capacity. Primary goods are mostly exported with minimal local value addition, shortening opportunities for industrial development and wealth creation (Clark & Robinson, 2021). The agribusiness sector contributes about 24% directly to GDP, and an additional 20% through related activities (Ikuemonisan, 2024), yet agro-processing remains largely underdeveloped in Nigeria, reflecting a persistent gap between production potential and value chain optimization.

The North Central region of Nigeria exemplifies this paradox of agricultural abundance alongside weak agribusiness transformation (Jimoh et al., 2026). The region been blessed agriculturally, bathed the tittle the "food basket of the nation" with Benue State taking the lead in yams and soya beans production, Niger State excelling in rice, maize and cereals, Plateau recognize as giants in potatoes, carrot, cabbage and vegetables, also Kogi State known for cassava, cashew and cereals, while Nasarawa and Kwara State contributing immensely to rice, cassava and maize production (PwC, 2020). Those regions not only dominate national rankings but also place Nigeria as the world's largest producer of yam, a top global producer of cassava, and a major hub for staples like millet, sorghum, and groundnut in West Africa. Despite this known benefit records, the region remains weak recent agribusinesses technology adoption and innovating act capable of transforming the agro-industry, this resulted in selling most agro products in raw form, with high rate of after harvest losses particularly in perishable crops such as fruits, vegetables, and cassava due to inadequate processing and storage facilities (Mohammed et al., 2022; Mthombeni et al., 2022; PwC, 2020). The weak innovation capability among local agro-processors means that large quantities of agro products either rot away or are exported as raw materials, only to be reimported as semi-finished or finished products at an expensive prices, showing both the production based strength and the weakness of its agribusiness innovation system, where agricultural abundance coexists with weak agro-processing competitiveness, low innovation adoption, obsolete practices, and fragile market linkages (Adeyeye et al., 2019; Aliu et al., 2021).

Over the past two decades, Nigeria has implemented several agribusiness technology and value-chain development initiatives aimed at improving productivity, processing efficiency, and market integration (Jimoh et al., 2026). Programmes such as the Presidential Cassava Initiative, Cassava Mechanization and Agro-processing Project (CAMAP), the Youth Employment in Agriculture Programme (YEAP), the IFAD Value Chain Development Programme (VCDP), and the Anchor Borrowers' Programme (ABP) introduced improved processing technologies, mechanization systems, storage facilities, extension services, and financial support mechanisms across major agricultural value chains (Mohammed et al., 2022). Although evaluations of these interventions reported improvements in output levels, processing capacity, income generation, and technology awareness among beneficiaries, the broader agribusiness sector has continued to experience limited value addition, weak commercialization outcomes, and low sustainability of innovation adoption. The mixed outcomes of these initiatives suggest that the successful adaptation and validation of agribusiness technologies extend beyond mere availability of technological solutions and financial support. Rather, the effectiveness of such interventions may depend on

entrepreneurs' psychological readiness to embrace innovation, exploit emerging opportunities, and sustain technology-driven business practices. This raises important questions regarding the behavioural factors that influence the translation of technological investments into sustainable agribusiness performance within the Nigerian context.

Despite the growing recognition of entrepreneurial behaviour in agribusiness development, the existing literature in Nigeria and Sub-Saharan Africa remains heavily concentrated on structural constraints, including inadequate infrastructure, financing gaps, policy inconsistencies, insecurity, and market imperfections (Mohammed et al., 2022). Comparatively, studies from developed and emerging economies increasingly demonstrate that entrepreneurial psychological attributes, particularly self-efficacy, entrepreneurial cognition, and subjective norms, significantly influence innovation adoption, value-chain upgrading, and long-term business sustainability (Ahmad, 2022; Begimkulov & Darr, 2023). However, empirical evidence linking these psychological factors to agribusiness sustainability remains scarce within the Nigerian agribusiness context. Furthermore, while previous studies have examined entrepreneurial psychology and firm performance separately, limited attention has been paid to understanding the mechanism by which entrepreneurial psychology influences agribusiness sustainability via innovation capability. Consequently, a theoretical and empirical gap exists regarding whether innovation capability serves as the pathway through which entrepreneurial psychological characteristics translate into sustainable agribusiness outcomes. Addressing this gap is particularly important for developing economies seeking to move beyond production-oriented agriculture towards innovation-driven and value-added agribusiness systems.

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Existing studies in developing economies have largely emphasized infrastructural deficits, policy inconsistencies, and financial constraints as key barriers to agribusiness development. Emerging studies from advanced and Asian economies suggest that entrepreneurial psychology, including self-efficacy, cognition, and social norms, plays a critical role in shaping innovation behaviour, value addition, and firm sustainability (Begimkulov & Darr, 2023; Thakur et al., 2025). In these contexts, agribusiness transformation is driven not only by external support systems but also by entrepreneurs' internal capabilities and mindset, which influence their ability to identify opportunities, adopt innovations, and scale value-chain activities (Ahmad, 2022). However, empirical research examining these behavioural dimensions within the African agribusiness context remains limited, creating a significant gap in both theory and practice.

This gap is particularly important when viewed from a cross-regional perspective. Many Asian economies that previously faced similar structural challenges, such as fragmented value chains, smallholder dominance, and limited industrialization, have achieved substantial progress by integrating entrepreneurial capability development with policy support and innovation systems (Chin et al., 2024). Therefore, understanding how entrepreneurial psychology influences agribusiness sustainability in Nigeria provides not only context-specific insights but also comparative lessons for other developing regions, especially in Asia, where inclusive agribusiness transformation and rural industrialization remain ongoing policy priorities.

It is against this backdrop of context-specific evidence that underscores the need for the current research that seeks to investigate the impact of entrepreneurial psychology conceptualized as entrepreneurial self-efficacy, subjective norms, and entrepreneurial cognition, mediated by innovation capability and how these traits influence agribusiness sustainability in North-Central Nigeria. By addressing this gap, the study will not only advance theoretical understanding, but also provide actionable insights for policymakers, practitioners, and entrepreneurs to reposition the agro-processing sector in developing economies from a dilapidated survivalist state to a more robust driver of food security,


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employment opportunities, and economic transformation. Importantly, these insights have broader relevance for emerging and developing economies, particularly in Asia, seeking to transition from primary agricultural production to competitive, innovation-driven agribusiness systems.

## Literature Review



### Entrepreneurial Psychology

Entrepreneurial psychology has long been recognized as central to explaining how entrepreneurs adopt innovations and sustain their businesses, but the precise mechanisms through which psychological constructs shape agribusiness sustainability remain contested. Somwethee et al. (2023) argue that entrepreneurial capability strongly enhances innovation capability, which in turn predicts sustainable organizational performance. The study, which focuses on community enterprises in Thailand, shows the mediating power of innovation capability, yet its focus raises questions on how such findings can be generalized to agribusiness firms in Nigeria and Africa. Similarly, Bekata and Kero (2024) revealed that entrepreneurship and customer orientations guide SMEs' innovation capabilities, thereby stimulating firm performance. While the findings align with Somwethee et al. (2023), the study views performance as a function not only of internal entrepreneurial resources but also of external market alignment (Asikhia & Naidoo, 2020; Sánchez-García et al., 2024; Zhang et al., 2019). This opinion sparks debate over whether innovation capability is driven by entrepreneurial psychology or market-oriented learning processes.

The role of cognition further hardened the controversial views. Karami et al. (2025) demonstrate the impact of entrepreneurial alertness and creativity on recognising opportunities and business model innovation, presenting cognition as a pillar of innovation adoption. Yet the work on non-agricultural SMEs minimizes its effects on agro-processing. Gutiérrez Cano et al. (2023), by contrast, adopt a systemic perspective, revealing that farmers' and producers' knowledge bases are important factors in innovation in the agribusiness sector and in sustainable development. This has created tension between taking cognition as an individual resource and as a group or organizational asset. While Karami et al. (2025) focus on the entrepreneur as a decision-maker, Gutiérrez Cano et al. (2023) emphasize that knowledge transmission networks are necessary at both micro and macro levels of cognition to fully comprehend innovation in agribusiness value chains.

Also, Shahriar et al. (2024), drawing on the Theory of Planned Behaviour, found that attitudes, perceived behavioural control and subjective norms significantly shape entrepreneurial intentions among students. The study revealed that subjective norms are the social field of entrepreneurial decision-making. Dong et al. (2022) also adopted the theory of planned behaviour to analyse agricultural technology and found that self-efficacy plays a strong role, whereas subjective norms have varying effects across social and cultural contexts. This inconsistency revealed that subjective norms may not operate as universally powerful predictors but instead function as unexpected or moderating factors (Jimoh et al., 2025). These reviewed studies suggest that subjective norms should be treated as a priority for entrepreneurial action and as variables whose effects depend on local culture, collectivism and community support structures (Dong et al., 2022; Gutiérrez Cano et al., 2023; Karami et al., 2025; Olaleye et al., 2024; Sanchez-Garcia et al., 2024).

At the centre of these streams lies the mediating construct innovation capability. Extant studies show that innovation capability regularly mediates the relationship between entrepreneurial constructs and sustainable output (Dong et al., 2022; Gutiérrez Cano et al., 2023; Karami et al., 2025). Yet these bodies of work have been criticized for an over-reliance on survey data from SMEs, leaving questions of casualty unresolved. Still, when placed alongside the findings of Somwethee et al. (2023) and Bekata and Kero (2024), a strong consensus

emerges that, without innovation capability, psychological resources such as self-efficacy, cognition, or entrepreneurial orientation cannot readily translate into firm sustainability or agribusiness value chain upgrading.

What becomes clear from the review is that entrepreneurial psychology cannot be examined in isolation from innovation capability and external conditions. Whereas some scholars emphasize internal psychological constructs (self-efficacy, cognition), others stress collective knowledge systems or market-oriented learning. Subjective norms are celebrated in some studies and downplayed in others, highlighting their context dependence. And while innovation capability is widely accepted as a mediating mechanism, most evidence comes from cross-sectional studies outside of agriculture, creating a significant empirical gap. To fill this gap, the current study sought to examine the impact of entrepreneurial psychology conceptualized as self-efficacy, subjective norms and entrepreneurial cognition mediated by innovation capability on agribusiness sustainability conceptualized as value-chain upgrading in agro-processing.

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A deeper examination of the literature reveals that the relationship between entrepreneurial psychology and agribusiness sustainability is underpinned by two complementary theoretical perspectives. Social Cognitive Theory explains how self-efficacy and cognitive processes shape entrepreneurial behaviour through confidence, learning, and opportunity recognition, while the Theory of Planned Behaviour emphasizes the role of subjective norms and perceived behavioural control in influencing entrepreneurial actions (Cai & Shi, 2022). Although these theories originate from different intellectual traditions, they converge on the proposition that entrepreneurial behaviour results from the interaction between internal psychological dispositions and external social influences. Existing empirical studies, however, have tended to examine these factors independently, often focusing on either cognitive dimensions or social influences without integrating them within a single explanatory framework. This fragmented approach limits understanding of how entrepreneurial self-efficacy, cognition, and subjective norms collectively influence innovation capability and sustainability outcomes in agribusiness firms. Therefore, the present study integrates these theoretical perspectives to provide a more comprehensive explanation of agribusiness sustainability in resource-constrained environments.

## Entrepreneurial Subjective Norms

The concept of Subjective norms is grounded in the Theory of Planned Behaviour and captures the extent to which individuals perceive social pressure to act in line with expectations of significant referents. Mohammadrezaei et al. (2022) demonstrated that these pressures are highly context-sensitive, and revealed that advisors' decisions in agriculture, health and safety were more strongly influenced by subjective norms in rural settings, where community ties and collective reputation are deeply embedded, than in more urbanized individualistic contexts. Similarly, Elnadi and Gheith (2021) on entrepreneurial behaviour among Indonesian SMEs illustrated that subjective norms play a stronger role in rural areas, where entrepreneurs depend on family and community approval, whereas in urban markets with greater anonymity, self-efficacy and opportunity recognition carry more weight. These findings imply that the application of subjective norms cannot be assumed uniform across contexts but rather varies with the density of social networks and the salience of collective identity.

Furthermore, the value of subjective norms has been demonstrated through variations in entrepreneurial outcomes. Elnadi and Gheith (2021) show that in environments characterized by strong collectivist norms, such as Middle Eastern communities, the subjective norm context can positively influence entrepreneurial intention but may alternatively hamper innovative risk-taking due to pressures for conformity. Alternatively, emerging African


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economies studied by Olaleye et al. (2024) suggest that subjective norms are weak in a fragmented and heterogeneous SME cluster in an urban region, as entrepreneurs rely more heavily on personal efficacy and market signals, with weaker normative pressures shaping behaviour. Put together, the contributions of subjective norms are not static drivers of intention or innovation; rather, they are possibility constructs, whose influence varies across geographical, social, and cultural contexts. This shows that, given the close connection to agribusiness sustainability, value-chain upgrading or innovation in rural agro-processing clusters may be strongly mediated by community norms, whereas that of urban processors may be individually driven.



**Entrepreneurial Cognition**

Entrepreneurial cognition is a concept in cognitive psychology and entrepreneurship theory that describes how entrepreneurs acquire, interpret, and utilize knowledge to identify opportunities, evaluate associated risks, and make strategic choices (Chi et al., 2023). Scholars have recently framed entrepreneurial cognition as both a dynamic mental process and structured knowledge systems (Sánchez-García et al., 2024). Chi et al. (2023) show that different types of cognitive schemas shape the innovativeness of new business models, with environmental scanning mediating the effect. This revealed that cognition provides a structured way of interpreting opportunities. Despite this, a more recent approach emphasizes metacognition. Entrepreneurial cognition extends beyond static scripts to include the adaptive ability to observe and shape thinking in uncertain situations. These studies are all trying to prove that entrepreneurial cognition is about what entrepreneurs possess in terms of knowledge and how they think about it.

In addition, entrepreneurial cognition is sensitive to the environment, varying its impacts across different environments. Sánchez-García et al. (2024) find that cognition in agrifood SMEs in Spain is influenced by the firm's interconnectivity, where shared interests and team learning enhance innovation. Chin et al. (2024) also added that in Malaysia, a transitional economy, regulatory uncertainty encourages entrepreneurs to flexibly switch between analytical and intuitive entrepreneurial intention. This opinion, based on extant studies alone, justifies the view that entrepreneurial cognition is not a linear attitude but a possible trait whose nature and influence depend on the institutional style and power, coupled with market philosophy and culture, within which it exists.

The relative arrangement of entrepreneurial cognition at a higher level of confidence determines the level of outcomes. Zhang et al. (2019) find that in collectivist societies, shared cognitive schemas can accelerate entrepreneurial intentions but simultaneously dampen risk-taking by enforcing conformity. Conversely, Elnadi and Gheith (2021) reveal that metacognitive flexibility enhances knowledge-related enterprises in pursuing demonstrated business model renewal. Olaleye et al. (2024), in a study conducted in Africa, revealed that entrepreneurial cognition can better adapt in institutions with poor settings than in rigid, structured institutions, thereby explaining the sustainability of ventures. These insights suggest that cognition is both schematic and context-independent, and central to whether entrepreneurial innovation capability translates into sustainability and conformity.

In rural agro-processing clusters, where community learning and shared scripts dominate, cognition may be socially embedded, aligning innovativeness and proactiveness with collective expectations and value-chain collaboration. Conversely, in heterogeneous urban clusters, individual metacognitive adaptability and dual-process decision-making are more critical, with entrepreneurs relying on heuristics and opportunity-driven adjustments rather than collective knowledge. Yet despite these advances, few studies have systematically examined entrepreneurial cognition in agribusiness SMEs in developing contexts, nor have they integrated its multi-dimensional nature schemas, cognitive styles, and metacognitive

regulations into models linking entrepreneurial capability to sustainability. The current study addresses this gap by testing the impact of entrepreneurial psychology conceptualized as self-efficacy, subjective norms, and entrepreneurial cognition mediated by innovation capability on agribusiness sustainability conceptualized as improvement in the value chain, extending both theory and practice in entrepreneurial research.



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## Entrepreneurial Self-Efficacy

Entrepreneurial self-efficacy originated from Bandura's (1997) social cognitive theory, which revealed that perceived self-efficacy shapes individuals' choices, persistence, and performance in uncertain contexts. Recent studies argue that entrepreneurial self-efficacy is a critical antecedent of entrepreneurial intention, resilience, and opportunity exploitation, but the scope of its influence varies across contexts. Jiang et al. (2017) posit that, when entrepreneurial self-efficacy is moderated by the quality of institutions and entrepreneurial education, it can positively predict entrepreneurial intention among students at European universities. These findings from extant studies establish self-efficacy as the motivation driving entrepreneurs' behaviour.

Also, many extant studies caution against overemphasizing the role of entrepreneurial self-efficacy. Entrepreneurial self-efficacy stimulates confidence, but can also lead to biased overconfidence, especially in highly uncertain environments. Zhang et al. (2019) echoed the view that entrepreneurs with very strong self-efficacy sometimes underestimate market risks, thereby scaling ventures prematurely and leading to eventual venture failures. Such findings revealed that entrepreneurial self-efficacy is not wholly impactful; its impact depends on whether it is balanced with perfect risk assessment and adaptive learning tools. Thus, the discord remains that entrepreneurial self-efficacy fundamentally operates as a protective and persistence resource stimulator that can reduce sound judgment in harsh environments.

Sanchez-Garcia et al. (2024), in Spanish agrifood small and medium enterprises, revealed that team support systems amplify the impact of entrepreneurial self-efficacy on innovation. Zhang et al. (2019) report that, in a broken Indonesian urban environment, individual entrepreneurial self-efficacy can serve as a substitute for weak social capital to sustain entrepreneurial action. In addition, Olaleye et al. (2024) revealed that entrepreneurial self-efficacy is particularly active where institutional emptiness restricts external support; strong self-efficacy entrepreneurs are likely to adopt sustainable practices despite lapses in infrastructure in developing economies. These positions in extant studies treat self-efficacy as an individual trait rather than as a construct whose expression and outcomes depend on sectoral, cultural, and institutional arrangements.

This discussion has a relative impact on the sustainability of agribusiness. In rural agro-processing communities, cluster ties may stimulate entrepreneurial self-efficacy through team learning and reciprocal encouragement, guiding it toward team sustainability objectives. Conversely, in urban and heterogeneous clusters, individual entrepreneurial self-efficacy may need to compensate for weaker networks, making personal confidence critical in navigating fragmented markets. Yet few studies have explicitly tested how entrepreneurial self-efficacy, mediated by entrepreneurial innovation capability, affects the sustainability of agribusiness SMEs, particularly in Asia and Sub-Saharan Africa. The current study fills this gap by testing the impact of entrepreneurial psychology, conceptualized as self-efficacy, subjective norms, and cognition, mediated by innovation capability, on agribusiness sustainability, conceptualized as an increase in value chain performance.


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**Entrepreneurial Innovation Capability**

Entrepreneurial innovation capability originated from the dynamic capabilities view (Teece, 2016), which emphasizes the firm's ability to reconfigure resources and competencies to adapt in volatile environments (Ochepa et al., 2026). Early foundational works described innovation capability as the organizational ability to transform ideas into new products, processes, and services, thus sustaining competitive advantage. In the early literature before 2020, the concept of innovation capability rebranded as entrepreneurial innovation capability has been expanded to include strategic orientation, organizational learning, and stakeholder collaboration, making it central not only to industrial competitiveness but also to sustainability outcomes in resource-constrained contexts such as agribusiness (Ahimbisibwe et al., 2025; Aliu et al., 2025; Otache, 2024).

Despite its wide acceptance, some studies argued that innovation capability is too context-dependent and multi-dimensional to serve as a reliable construct across sectors and geographies. Extant studies have argued that African agribusinesses face infrastructural deficits and structured markets with scarce research and development investments; innovation capacity may appear as a dependent outcome of external conditions rather than as an independent variable (Mustapha, 2025; Olaleye et al., 2024; Somwethee et al., 2023). These opinions revealed that innovation capability cannot regularly mediate firm performance because its drivers, environmental policy, infrastructure, and cultural norms, are never stable or evenly distributed. Additionally, a body of research has argued that innovation capability, as a mediator, precisely advances strength in a scarce resource environment because it shows how firms translate external disadvantages into internal strategies and gains (Ahimbisibwe et al., 2025; Otache, 2024).

To improve the discussion, Ahimbisibwe et al. (2025) added that innovation capacity in products and organizations stimulates both local and international competitiveness, even in the face of weak infrastructure, showing that innovation capacity can moderate the relationship between restrictiveness and competitiveness. On closer inspection, Otache (2024) revealed that small and medium enterprises with strong innovation capacity utilize strategic flexibility to surpass peers in a competitive market, positioning innovation capability as an adaptive bridge rather than a dependent outcome.

Many extant studies reviewed supported the opinion that innovation capability can be meaningfully positioned as a mediator between entrepreneurial orientation (innovativeness, risk-taking, and proactiveness) and sustainability outcomes, this is because entrepreneurial efforts may remain latent and uncoordinated without innovation capability to transform entrepreneurial drive into process upgrades, value-addition, and resilience in food supply chains (Aliu et al., 2025; Chi et al., 2023; Sanchez-Garcia et al., 2024). This makes innovation capability an actionable mechanism rather than a passive attribute (Otache, 2024; Saunila and Ukko, 2022; Aliu and Oni, 2020).

Collectively, the reviewed studies suggest that innovation capability occupies a strategic position between entrepreneurial resources and sustainability outcomes. However, disagreement remains regarding whether innovation capability should be viewed primarily as a response to favorable environmental conditions or as an internally generated capability that enables firms to overcome environmental constraints. Dynamic Capability Theory supports the latter perspective by arguing that firms can reconfigure resources and adapt to changing environments through innovative actions. In contrast, institutional perspectives emphasize the limiting effects of weak infrastructure, policy instability, and market imperfections. The coexistence of these perspectives suggests that innovation capability may serve as a bridging mechanism that transforms entrepreneurial psychological attributes into sustainable agribusiness outcomes. Yet, empirical evidence validating this mechanism within agribusiness firms operating in developing economies remains limited.

Extant literature from 2020 to 2026 shows limited focus on agribusiness clusters in emerging and resource-constrained economies, particularly in sub-Saharan Africa (Jimoh et al., 2025). Existing studies largely emphasize general SME performance or focus on developed and relatively stable institutional contexts (Jimoh et al., 2025). Consequently, insufficient attention has been given to how innovation capability functions as a strategic mechanism linking entrepreneurial factors to sustainability outcomes, especially in agro-processing firms operating under infrastructural deficiencies, policy inconsistencies, and institutional constraints, conditions that are also prevalent across many Asian developing economies. Addressing this gap, the present study adopts North Central Nigeria as an empirical context, not merely as a local setting but as a representative case of structurally constrained agribusiness environments. Nigeria is a representative case; this study provides insights of broader relevance to socio-economic development, public policy, and business strategy in emerging economies, particularly in Asia.

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## Agribusiness Sustainability

Agribusiness sustainability is a broader concept that integrates environmental stewardship, economic viability, and social attributes. These opinions define sustainability as the ability of agribusinesses to continually increase the use of innovative factors to improve efficiency, quality, and competitiveness. Extant Studies debate whether treating agribusiness sustainability as just value chain upgrading is narrow and potentially reduces its capacity. This shows that taking agribusiness sustainability as an increase in value chain risks avoiding ecological resilience and social equity, which are equally vital tools of sustainable agribusiness (Jimoh et al., 2025).

Value chain upscaling is a structured pathway to agribusiness sustainability, especially in resource-scarce environments. Strengthening the relationship among production, processing, and marketing enhances multiplier effects that can indirectly mitigate environmental and social issues. Additionally, Ahimbisibwe et al. (2025) discovered that advanced product and organizational innovation capabilities in agro-processing firms enhanced international competitiveness by upholding long-term viability. In the same vein, Otache (2024) revealed that small and medium enterprises with designed value chains achieved greater performance and resilience under competitive pressure, supporting the argument that value chain growth is a key substitute for agribusiness sustainability.

Nigerian agribusiness sustainability, particularly in the North Central, largely adopts an increase in value chain as an instrument; extant studies mostly use it to assess resilience in agro-processing firms. The higher up the value chain, the greater the reduction in post-harvest losses, the greater the increase in market access, and the higher the returns for farmers, processors, and distributors. Also, innovation capability mediates the relationship by enabling firms to adopt new technologies, develop market-focused products, and strengthen network collaboration, thereby expanding the chain's reach (Begimkulov & Darr, 2023). Sustainability, coated as value chain, becomes a business performance identifier and a transformative mechanism for rural development.

The extant literature reviewed has linked the value chain to firm competitiveness and sustainability in Africa and Asia (Ahimbisibwe et al., 2025; Huang et al., 2025; Jimoh et al., 2025). However, the literature focuses on generic SME sustainability or environmental practices and impacts, creating a substantial gap in the literature on context-specific, value-chain impact analyses of agribusiness sustainability. This identified gap prompted the current study to investigate and contribute to agribusiness theory and practice by validating sustainability as value chain upgrading in structurally constrained agribusiness environments such as Nigeria.


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## Conceptual framework

This study built on the three major dimensions of entrepreneurial psychology to examine their effect on agribusiness sustainability. Specifically, it examines how entrepreneurial self-efficacy, entrepreneurial subjective norms, and entrepreneurial cognition influence agribusiness sustainability through entrepreneurial innovation capability as a mediating variable. Figure 1 presents the conceptual framework of the study

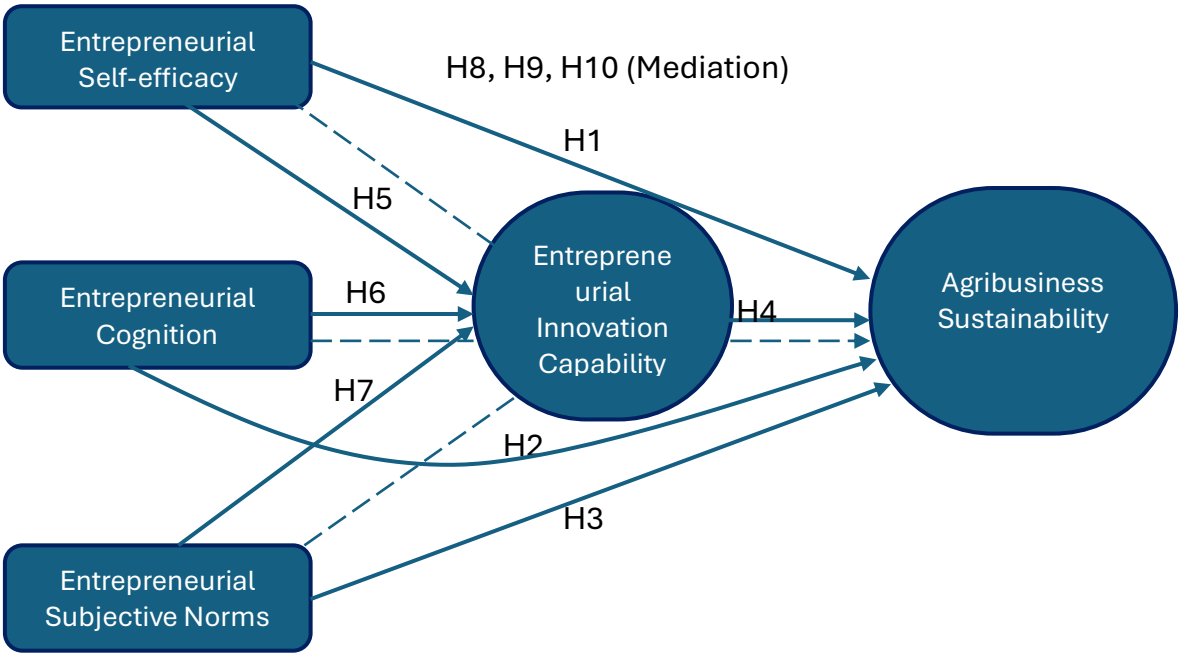


*Figure 1. Conceptual Framework*
*Source: Author (2026)*

## Hypotheses Development

The conceptual framework presented in Figure 1 illustrates an integrated model for explaining agribusiness sustainability in the context of a developing economy. The model links entrepreneurial psychology, operationalized through entrepreneurial self-efficacy, entrepreneurial subjective norms, and entrepreneurial cognition, to agribusiness sustainability, both directly and indirectly through entrepreneurial innovation capability. This structure reflects the growing recognition that firm sustainability is shaped not only by external conditions but also by entrepreneurs' internal behavioural and cognitive factors.

At the core of the framework are three key psychological constructs. Entrepreneurial self-efficacy is the entrepreneur's belief in their ability to successfully perform tasks such as opportunity recognition, resource mobilization, and innovation. Entrepreneurial cognition captures the knowledge structures and mental processes that guide decision-making, opportunity evaluation, and strategic thinking. Entrepreneurial subjective norms reflect perceived social pressures and expectations from family, peers, and community, which may influence entrepreneurial behaviour and strategic choices. These constructs are grounded in social cognitive theory and the theory of planned behaviour, both of which emphasize that behaviour is shaped by internal beliefs and social context.

The framework proposes that these psychological factors influence agribusiness sustainability, which this study conceptualizes as value-chain upgrading, including improvements in processing, product quality, market access, and overall competitiveness. Arrows from each psychological construct to agribusiness sustainability indicate direct

relationships, suggesting that entrepreneurs with stronger self-belief, better cognitive capabilities, and supportive social environments are more likely to achieve sustainable outcomes. Thus, the study develops the following hypotheses:

H1: Entrepreneurial self-efficacy has a significant impact on agribusiness sustainability.

H2: Entrepreneurial cognition has a significant impact on agribusiness sustainability.

H3: Entrepreneurial subjective norms have a significant impact on agribusiness sustainability.

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In addition to these direct effects, the model introduces innovation capability as a mediating construct. Innovation capability reflects the firm's ability to transform ideas into improved products, processes, and systems. It serves as a critical mechanism by which entrepreneurial psychological traits translate into tangible sustainability outcomes. In resource-constrained agribusiness environments, innovation capability enables firms to reduce post-harvest losses, enhance efficiency, and strengthen value-chain integration. Thus, the study developed the following hypotheses:

H4: Entrepreneurial innovation capability has a significant impact on agribusiness sustainability

H5: Entrepreneurial self-efficacy has a significant impact on entrepreneurial innovation capability.

H6: Entrepreneurial cognition has a significant impact on entrepreneurial innovation capability.

H7: Entrepreneurial subjective norms have a significant impact on entrepreneurial innovation capability.

All directional arrows in the framework represent hypothesized positive relationships. The model assumes that stronger entrepreneurial psychological attributes enhance innovation capability, which in turn improves agribusiness sustainability. At the same time, direct paths from psychological constructs to sustainability are included to capture effects that may not fully depend on innovation processes, such as decision-making speed, resilience, and strategic orientation. As such, innovation capability acts as a transmission mechanism through which entrepreneurial psychological traits influence sustainability outcomes. Thus, the study developed the following hypotheses:

H8: Entrepreneurial innovation capability mediates the relationship between entrepreneurial self-efficacy and agribusiness sustainability.

H9: Entrepreneurial innovation capability mediates the relationship between entrepreneurial cognition and agribusiness sustainability.

H10: Entrepreneurial innovation capability mediates the relationship between entrepreneurial subjective norms and agribusiness sustainability.

## Theoretical Framework

The current study rests on Social Cognitive Theory, introduced by Bandura in 1986 and elaborated in 1997, which posits a reciprocal interaction among personal factors, environmental influences, and behavioural factors (Bandura, 2002). The theory revealed that personal factors, which are cognitive and emotional, and environmental factors, such as social norms, engage in a dynamic interplay (Cai & Shi, 2022). This means that those elements interact and influence each other. Cognitive processes influence entrepreneurial action and performance outcomes. Self-efficacy promotes persistence in challenging environments,


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while cognition shapes opportunity recognition and decision-making. These approaches influence how entrepreneurs are molded and develop their innovation capacity, serving as a recipe for achieving sustainable results in agribusinesses. Also, while social cognitive theory adequately captures internal personal attributes, external social pressures and expectations were not captured in the picture, which are essential in molding entrepreneurial behaviour.

To address these shortcomings, the Theory of Planned Behaviour, developed by Ajzen in 1991, is employed to bridge the gap with social cognitive theory. The Theory of Planned Behaviour explains how attitudes, perceived behavioural control, and subjective norms shape behaviour. This proves the theory to be relatively relevant in the agribusiness domain, where cultural heritage, community expectations, and family influence play a vital role in making decisions. Innovation capability can be seen as the behavioural outcome that mediates the link between these entrepreneurial factors and the sustainability of agribusiness ventures.



Integrating the two theories benefits the study by giving it a more holistic framework. The social cognitive theory provides the internal cognitive-behavioural mechanisms (self-efficacy and cognition), while the theory of planned behaviour incorporates the external social dimension (subjective norms). Together, they explain how entrepreneurs not only believe in their abilities and process opportunities cognitively but also respond to the pressures and expectations of their social environment. Combining the two theoretical insights provides a powerful explanatory framework for understanding how entrepreneurial self-efficacy, cognition, and subjective norms, mediated by innovation capability, relate to agribusiness sustainability.

The integration of Social Cognitive Theory and the Theory of Planned Behaviour also helps explain the inconsistencies reported in previous empirical studies. For instance, studies emphasizing self-efficacy and entrepreneurial cognition generally report stronger effects on innovation and performance outcomes, consistent with Social Cognitive Theory's assertion that individual beliefs and cognitive processes drive behaviour. Conversely, studies highlighting subjective norms often report context-dependent effects, suggesting that social influences vary across institutional and cultural environments, a position consistent with the Theory of Planned Behaviour. By combining both theoretical lenses, the present study recognizes that agribusiness sustainability cannot be adequately explained by either internal psychological factors or external social influences alone. Rather, sustainability outcomes emerge from the interaction between entrepreneurs' beliefs, cognitive capabilities, social environments, and their ability to convert these resources into innovation capability. This integrated perspective provides a stronger theoretical basis for examining agribusiness sustainability in developing economies characterized by institutional constraints and resource limitations.

## Methodology

### Source of Data

This study adopts a quantitative survey design targeting agro-processing business owners and managers to examine the effects of components of entrepreneurial psychology on agribusiness sustainability, with innovation capability as a mediating variable in a competitive and resource-constrained environment. The empirical focus on agro-processing firms reflects their strategic importance in driving rural industrialization, value addition, and inclusive economic development, issues that are equally relevant across many emerging economies, particularly in Asia.

The population of the study is the total number of registered agribusinesses in North Central Nigeria. According to the National Bureau of Statistics and Small and Medium Enterprises Development Agency of Nigeria in the MSMEs Survey Report (2021), agribusiness-related enterprises account for 27,401 enterprises, representing approximately 2.2% of the total

1,240,965 enterprises in Nigeria (NBS & SMEDAN, 2021; PwC, 2024). Using the enterprise distribution across states provided in the MSMEs Survey Report, the estimated population of agro-processing enterprises in the North Central states was derived in proportion to the total number of enterprises recorded in Benue, Kogi, Kwara, Nasarawa, Niger, and Plateau States. The estimated distribution suggests that the region accounts for approximately 5,761 agro-business enterprises, which constitutes the target population for this study, with Plateau State having 684 agri-business enterprises, 1,310 in Benue State, 1,348 in Nasarawa State, 1,113 in Niger State, 412 in Kwara State, and 894 in Kogi State. The use of proportional estimation is considered appropriate given the lack of region-specific agribusiness enterprise data and has been adopted to ensure adequate representation of agro-processing firms in the study area.

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The study adopts a stratified random sampling technique to determine the sample size, using the population's spread across the state as strata. The technique was considered appropriate because it improves representativeness by ensuring that all strata are adequately represented in the sample. Using Taro Yamane's formula, the sample size was determined to be 375 firms. In line with recommendations by Asikhia and Naidoo (2020), 10% of the sample size was added for possible non-response, missing questionnaires, incomplete responses, or incorrectly filled questionnaire(s), resulting in a final sample size of 413 respondents. Thereafter, proportionate stratified sampling was applied to distribute the sample across Plateau, Benue, Nasarawa, Niger, Kwara, and Kogi States based on the relative population of agribusiness enterprises in each state. This method minimizes sampling error, preserves the population structure, and enhances the external validity of the findings by ensuring that each state's contribution to the sample reflects its actual proportion within the target population.

Using proportionate stratified sampling, the sample size for each state was determined using the formula: ni = (Ni/N) x n. Where: ni = sample size for each state; Ni = population of agribusiness enterprises in each state; N = total population of agribusiness enterprises in North Central Nigeria (5,761); and n = total sample size (413). Based on this computation, the proportionate distribution of the sample size across the six states is presented in Table 1.

*Table 1. Proportionate allocation of sample size*

| State | Population of Agribusiness Enterprise | Sample Size |
|---|---|---|
| Plateau | 684 | 49 |
| Benue | 1,310 | 94 |
| Nasarawa | 1,348 | 97 |
| Niger | 1,112 | 80 |
| Kwara | 412 | 29 |
| Kogi | 894 | 64 |
| **Total** | **5,761** | **413** |

*Source: Authors' Field Survey (2026)*

The study uses a structured questionnaire, adapted from extant studies on entrepreneurial psychology and agribusiness sustainability, to collect data. This instrument is suitable for capturing entrepreneurial psychological traits and their effect on agribusiness sustainability, while ensuring wider coverage of enterprises in the region. To ensure consistency and reliability in data collection, the questionnaire items were adapted from validated scales used in previous studies.


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### Data Analysis Technique

The study employed Partial Least Squares Structural Equation Modelling (PLS-SEM) to analyse the hypothesized relationships among the constructs. The choice of PLS-SEM was informed by several considerations. First, the study seeks to examine complex relationships involving multiple latent constructs and mediating effects simultaneously. Second, PLS-SEM is particularly suitable for prediction-oriented studies and theory development in emerging research areas. Third, the technique is robust when analysing data obtained from relatively heterogeneous samples and does not impose strict assumptions regarding multivariate normality. Furthermore, PLS-SEM has been widely adopted in entrepreneurship, innovation, and sustainability research due to its ability to estimate measurement and structural models concurrently and to provide a reliable assessment of mediation effects.



## Results and Discussion

### Response Rate

A total of 413 questionnaires were administered to agribusiness owners and managers, specifically agro-processors, across the six states in North Central Nigeria. At the conclusion of the data collection exercise, 391 complete questionnaires were retrieved and deemed valid for analysis, representing a response rate of 94.7%, which is considered adequate for quantitative analysis and generalization. Table 2 presents the respondents' educational attainment across different levels. Of the 391 valid responses, the majority, at 30.43%, held a Senior Secondary Certificate of Education (SSCE), indicating that a significant proportion of youths in the study area have attained secondary education as their highest qualification. This is followed by 28.39% who held higher education qualifications such as HND/B.Sc., and 18.93% with NCE/ND qualifications. A smaller proportion, totaling 8.95%, had only primary education, while 0.77% of the respondents had no formal education at all. Respondents with postgraduate qualifications (PGD/M.Sc./Ph.D.) were the least represented, accounting for only 12.53% of the total.

*Table 2. Respondents' demographic profiles*

| Variable | Frequency | Percent |
|---|---|---|
| No school attended | 03 | 0.77 |
| Primary education | 35 | 8.95 |
| SSCE | 119 | 30.43 |
| NCE/ND | 74 | 18.93 |
| HND/BSc | 111 | 28.39 |
| PGD/MSc/PhD | 49 | 12.53 |
| **Total** | **391** | **100.0** |

*Source: Authors' Field Survey (2026)*

Overall, the findings suggest that most agro-processing entrepreneurs have at least a basic to intermediate level of formal education, which may influence their capacity to adopt innovative practices and make strategic decisions. This educational distribution is characteristic of agro-based enterprises in many developing and emerging economies, thereby enhancing the broader applicability of the study's findings beyond the immediate study area.

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## Assessment of the measurement model

Figure 2 summarizes the results of the PLS-SEM analysis examining the relationship between entrepreneurial psychology, mediated by innovation capability, and agribusiness sustainability.

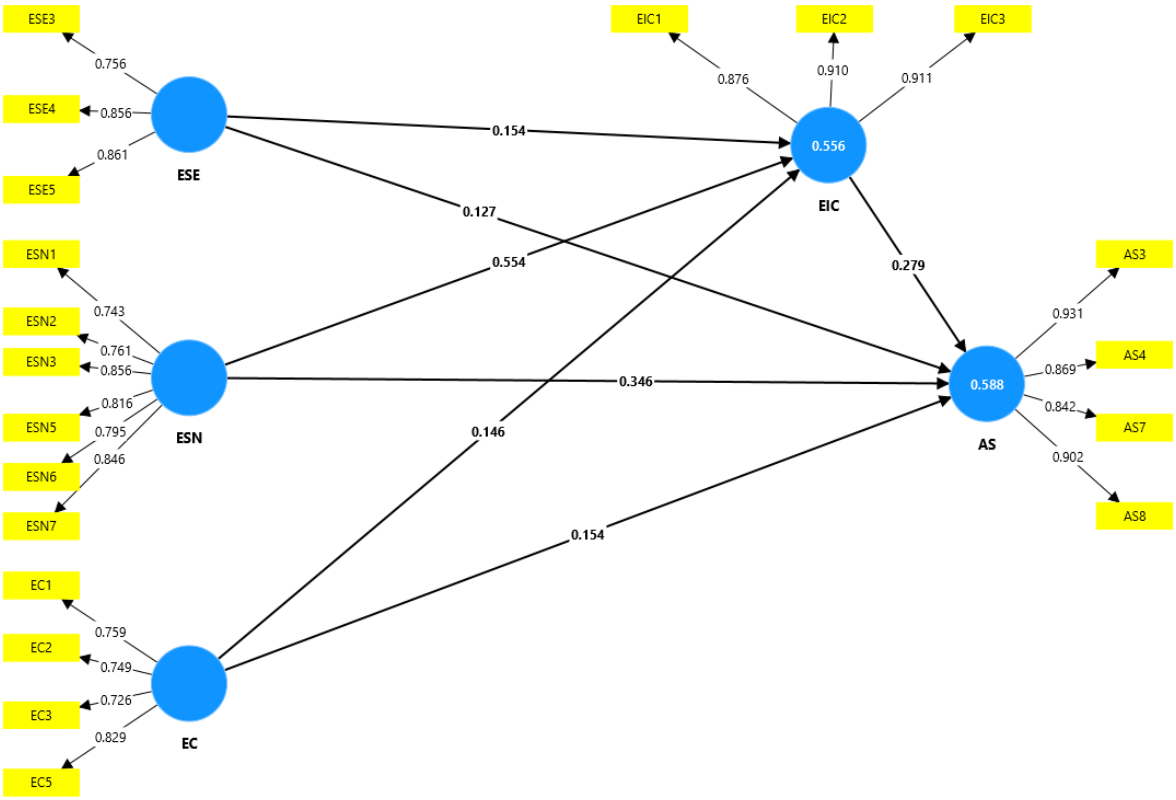


*Figure 2. Assessment of Measurement Model*
*Source: Authors' Field Survey (2026).*

## Reliability and Validity of Measurement Model

The measurement model was first evaluated for predictor variable reliability, internal consistency reliability, convergent validity, and discriminant validity. In the initial assessment, all indicators of entrepreneurial self-efficacy (ESE), entrepreneurial subjective norms (ESN), entrepreneurial cognition (EC), entrepreneurial innovation capability (EIC), and agribusiness sustainability (AS) exhibited outer loadings above the recommended minimum threshold of 0.70 (Hair et al., 2019), except for EC3 (0.726), which was still considered acceptable since it surpassed the 0.60 cut-off. This indicates that the indicators make a satisfactory contribution to their respective constructs, thereby confirming their reliability. The high outer loadings, ranging from 0.726 to 0.931, strongly complement the Cronbach's alpha and composite reliability, which exceed the threshold of 0.70 across all constructs. This confirms that the items consistently measure their underlying constructs. Also, the Average Variance Extracted (AVE) values are above the 0.50 benchmark, given the strong indicator loadings, thereby confirming convergent validity.


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*Table 3. Reliability and convergent validity*

| Construct | Item | Factor Loading | Cronbach's Alpha | CR | AVE |
|---|---|---|---|---|---|
| Agribusiness sustainability | AS3 | 0.931 | 0.909 | 0.936 | 0.786 |
| | AS4 | 0.869 | | | |
| | AS7 | 0.842 | | | |
| | AS8 | 0.902 | | | |
| Entrepreneurial cognition | EC1 | 0.759 | 0.765 | 0.851 | 0.588 |
| | EC2 | 0.749 | | | |
| | EC3 | 0.726 | | | |
| | EC5 | 0.829 | | | |
| Entrepreneurial Innovation Capability | EIC1 | 0.876 | 0.881 | 0.927 | 0.808 |
| | EIC2 | 0.910 | | | |
| | EIC3 | 0.911 | | | |
| Entrepreneurial self-efficacy | ESE3 | 0.756 | 0.766 | 0.865 | 0.682 |
| | ESE4 | 0.856 | | | |
| | ESE5 | 0.861 | | | |
| Entrepreneurial subjective norms | TN1 | 0.822 | 0.891 | 0.916 | 0.646 |
| | ESN1 | 0.743 | | | |
| | ESN2 | 0.761 | | | |
| | ESN3 | 0.856 | | | |
| | ESN5 | 0.816 | | | |
| | ESN6 | 0.795 | | | |
| | ESN7 | 0.846 | | | |

*Source: Author's Field Survey (2026)*

Discriminant validity was further assessed using cross-loadings and the Fornell–Larcker criterion. Each indicator loaded more strongly on its respective construct than on any other, meeting the discriminant validity requirement. Furthermore, the square roots of the average variance extracted are greater than the inter-construct correlations, indicating that each construct is empirically distinct from the others. This suggests that while the constructs are moderately correlated, they capture different conceptual domains. Overall, the measurement model demonstrates strong reliability and validity, providing confidence in the use of the latent constructs in evaluating the structural model. Tables 3, 4, and 5 present the detailed results of the reliability and validity analysis of the measurement model.

*Table 4. Discriminant Validity – Fornell Larcker criterion.*

| | AS | EC | EIC | ESE | ESN |
|---|---|---|---|---|---|
| **AS** | 0.887 | | | | |
| **EC** | 0.576 | 0.767 | | | |
| **EIC** | 0.677 | 0.546 | 0.899 | | |
| **ESE** | 0.549 | 0.625 | 0.529 | 0.826 | |
| **ESN** | 0.695 | 0.549 | 0.713 | 0.513 | 0.804 |

*Source: Author's Field Survey (2026)*

*Table 5. Discriminant Validity – Cross loadings.*

| | AS | EC | EIC | ESE | ESN |
|---|---|---|---|---|---|
| AS3 | **0.931** | 0.569 | 0.644 | 0.502 | 0.661 |
| AS4 | **0.869** | 0.630 | 0.607 | 0.491 | 0.567 |
| AS7 | **0.842** | 0.390 | 0.605 | 0.484 | 0.661 |
| AS8 | **0.902** | 0.441 | 0.536 | 0.466 | 0.567 |
| EC1 | 0.414 | **0.759** | 0.339 | 0.428 | 0.374 |
| EC2 | 0.424 | **0.749** | 0.472 | 0.507 | 0.405 |
| EC3 | 0.392 | **0.726** | 0.464 | 0.456 | 0.389 |
| EC5 | 0.529 | **0.829** | 0.392 | 0.516 | 0.505 |
| EIC1 | 0.582 | 0.483 | **0.876** | 0.403 | 0.626 |
| EIC2 | 0.584 | 0.482 | **0.910** | 0.497 | 0.589 |
| EIC3 | 0.654 | 0.507 | **0.911** | 0.521 | 0.701 |
| ESE3 | 0.327 | 0.506 | 0.443 | **0.756** | 0.450 |
| ESE4 | 0.539 | 0.522 | 0.431 | **0.856** | 0.371 |
| ESE5 | 0.472 | 0.523 | 0.442 | **0.861** | 0.462 |
| ESN1 | 0.389 | 0.314 | 0.497 | 0.275 | **0.743** |
| ESN2 | 0.508 | 0.378 | 0.460 | 0.341 | **0.761** |
| ESN3 | 0.575 | 0.399 | 0.537 | 0.436 | **0.856** |
| ESN5 | 0.601 | 0.472 | 0.600 | 0.478 | **0.816** |
| ESN6 | 0.623 | 0.552 | 0.644 | 0.517 | **0.795** |
| ESN7 | 0.607 | 0.487 | 0.658 | 0.383 | **0.846** |

*Source: Author's Field Survey (2026)*

### Multicollinearity assessment

Variance Inflation Factor (VIF) values were employed to examine multicollinearity among the predictor constructs. All VIF values were below the conservative cut-off of 3.3 (see Table 6). These values indicate the absence of multicollinearity and suggest that the predictor variables are not redundant, thereby ensuring stability in structural model estimation (Wang et al., 2024).

*Table 6. Collinearity Statistics (VIF) – Inner Model List*

| Measurement | VIF |
|---|---|
| **EC -> AS** | 1.905 |
| **EC -> EIC** | 1.857 |
| **EIC -> AS** | 2.252 |
| **ESE -> AS** | 1.812 |
| **ESE -> EIC** | 1.759 |
| **ESN -> AS** | 2.227 |
| **ESN -> EIC** | 1.536 |

*Source: Author's Field Survey (2026)*

### Assessment of Structural Model

This section presents the analysis of the direct and indirect effects, as shown in Figure 3 and Table 7, which are used to test the study's hypothesis.

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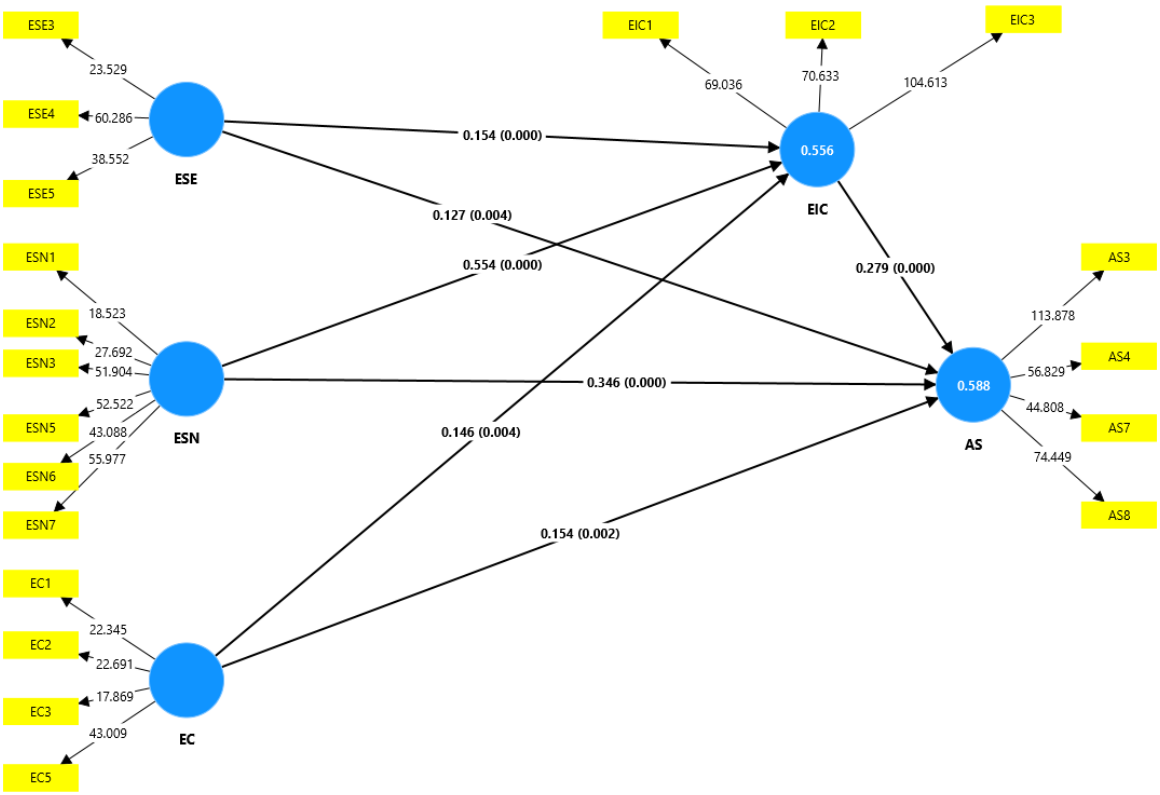


*Figure 3. Assessment of Measurement Model*
*Source: Author's Field Survey.*

*Table 7. Path coefficients (direct effects)*

| | Original sample (O) | Sample mean (M) | Standard deviation (STDEV) | T statistics (\|O/STDEV\|) | P values |
|---|---|---|---|---|---|
| **EC -> AS** | 0.154 | 0.154 | 0.051 | 3.035 | 0.002 |
| **EC -> EIC** | 0.146 | 0.145 | 0.051 | 2.879 | 0.004 |
| **EIC -> AS** | 0.279 | 0.280 | 0.053 | 5.308 | 0.000 |
| **ESE -> AS** | 0.127 | 0.128 | 0.044 | 2.869 | 0.004 |
| **ESE -> EIC** | 0.154 | 0.154 | 0.037 | 4.104 | 0.000 |
| **ESN -> AS** | 0.346 | 0.345 | 0.052 | 6.620 | 0.000 |
| **ESN -> EIC** | 0.554 | 0.555 | 0.048 | 11.504 | 0.000 |

*Source: Authors' Field Study (2026)*

Table 7 shows the results of a structural equation model (SEM) or a Partial Least Squares Path Modeling (PLS-PM) analysis, where the outcome is Agribusiness Sustainability (AS), the mediating variable is entrepreneurial innovation capability (EIC), and the independent variables are: EC = Entrepreneurial cognition, ESE = Entrepreneurial self-efficacy, and ESN= Entrepreneurial subjective norms. Table 7 revealed the model strength and direction of the hypothesized relationships. For instance, the path coefficient of EC → AS (β = 0.154, t = 3.035, p = 0.002) indicates a positive and statistically significant relationship between entrepreneurial cognition and agribusiness sustainability. This implies that a 1-unit increase in entrepreneurial cognition will result in a 0.154-unit increase in agribusiness sustainability in the study area.

Similarly, ESE → AS (β = 0.127, t = 2.869, p = 0.004) indicates that entrepreneurial self-efficacy has a significant positive effect on agribusiness sustainability. The results further reveal that ESN → AS (β = 0.346, t = 6.620, p = 0.000) has the strongest direct positive effect, suggesting that entrepreneurial subjective norms exert a more substantial influence on agribusiness sustainability compared to other entrepreneurial factors. Moreover, EIC → AS (β = 0.279, t = 5.308, p = 0.000) confirms that innovation capability significantly strengthens sustainability outcomes in agro-processing firms.



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Regarding the mediating paths, the results show that ESE → EIC (β = 0.154, t = 4.104, p = 0.000), EC → EIC (β = 0.146, t = 2.879, p = 0.004), and ESN → EIC (β = 0.554, t = 11.504, p = 0.000) are all significant. This indicates that innovation capability is significantly explained by entrepreneurial self-efficacy, cognition, and subjective norms.

Overall, the p-values (all below 0.05) indicate that the path coefficients are statistically significant and highly reliable, given the low standard errors and strong t-statistics. The adjusted $R^2$ of 0.583 for AS and 0.552 for EIC further indicates that about 58.3% of the variance in agribusiness sustainability and 55.2% of the variance in innovation capability are explained by the entrepreneurial constructs in the model. This suggests that the structural model has good explanatory power and demonstrates strong predictive relevance for agribusiness sustainability in the study area. This reinforces the model's robustness and highlights its applicability to understanding agribusiness performance in structurally constrained and emerging economic contexts.

The results in Table 8 revealed that entrepreneurial innovation capability (EIC) significantly mediates the relationships between all the entrepreneurial psychology variables and agribusiness sustainability (AS). Specifically, the indirect effect of entrepreneurial self-efficacy (ESE) on AS through EIC (ESE → EIC → AS) is positive and significant (β = 0.043, t = 3.483, p = 0.001), indicating that higher self-efficacy enhances sustainability outcomes via improved innovation capability.

*Table 8. Specific indirect effects*

| | Original sample (O) | Sample mean (M) | Standard deviation (STDEV) | T statistics (\|O/STDEV\|) | P values |
|---|---|---|---|---|---|
| **ESE -> EIC -> AS** | 0.043 | 0.043 | 0.012 | 3.483 | 0.001 |
| **ESN -> EIC -> AS** | 0.155 | 0.155 | 0.033 | 4.729 | 0.000 |
| **EC -> EIC -> AS** | 0.041 | 0.041 | 0.018 | 2.278 | 0.023 |

*Source: Authors' Field Study (2026)*

Similarly, entrepreneurial subjective norms (ESN) exhibit the strongest indirect effect on AS through EIC (β = 0.155, t = 4.729, p < 0.001), suggesting that social influence plays a substantial role in driving innovation capability, which in turn promotes agribusiness sustainability. This implies that supportive social expectations can significantly strengthen sustainable practices when channelled through innovation. In addition, entrepreneurial cognition (EC) also shows a significant, though relatively weaker, indirect effect on AS via EIC (β = 0.041, t = 2.278, p = 0.023). Overall, the findings confirm that EIC is a crucial mediating mechanism, as all indirect effects are positive and statistically significant (p < 0.05), reinforcing its role in translating entrepreneurial psychological factors into sustainable agribusiness outcomes.


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To determine the type of mediation, we compare the significance of both the direct effects (Table 7) and the indirect effects (Table 8) following standard PLS-SEM guidelines. ESE → AS is significant (β = 0.127, p = 0.004) and its indirect effect via EIC is also significant (β = 0.043, p = 0.001). ESN → AS is significant (β = 0.346, p < 0.001) and its indirect effect via EIC is also significant (β = 0.155, p < 0.001).EC → AS is significant (β = 0.154, p = 0.002) and its indirect effect via EIC is equally significant (β = 0.041, p = 0.023). Both the direct and indirect effects are significant in all three relationships and point in the same (positive) direction. Consequently, the mediation is classified as complementary partial mediation for ESE, ESN, and EC.



## Discussion

### The Effect of Entrepreneurial Psychology on Agribusiness Sustainability (H1 – H3)

The findings revealed that entrepreneurial self-efficacy, entrepreneurial cognition, and entrepreneurial subjective norms significantly and positively influence agribusiness sustainability. Among the three dimensions, entrepreneurial subjective norms exerted the strongest effect, followed by entrepreneurial cognition and entrepreneurial self-efficacy. This suggests that sustainable agribusiness development in North Central Nigeria is influenced not only by the entrepreneur's personal confidence and cognitive abilities but also by the social environment within which business decisions are made.

The positive effect of entrepreneurial self-efficacy, with a coefficient of 0.127 and a p-value of 0.004, indicates that entrepreneurs with greater confidence in their ability to identify opportunities, mobilize resources, and overcome challenges are more likely to achieve sustainable agribusiness outcomes. This means that a 1-unit increase in entrepreneurial self-efficacy leads to a 0.127-unit increase in agribusiness sustainability. Thus, the first hypothesis (H1), which states that "entrepreneurial self-efficacy has a significant impact on agribusiness sustainability", was supported. In resource-constrained environments characterized by infrastructural deficiencies, market uncertainties, and limited institutional support, self-efficacy appears to function as a psychological resource that encourages persistence and strategic adaptation. This finding supports Social Cognitive Theory, which argues that individuals with stronger efficacy beliefs are more likely to undertake challenging activities and sustain performance over time. The finding is consistent with Olaleye et al. (2024), who reported that entrepreneurial confidence enhances sustainable business practices in emerging economies.

Similarly, entrepreneurial cognition was found to significantly influence agribusiness sustainability. The result revealed a coefficient of 0.154, indicating a positive relationship between entrepreneurial cognition and agribusiness sustainability. The t-statistic of 3.035 is above the normal threshold of 1.96, with a p-value of 0.002, indicating strong significance in the relationship. This means that a percentage increase in entrepreneurial cognition will increase agribusiness sustainability by 0.154 percent. Thus, the second hypothesis (H2), which states that "entrepreneurial cognition has a significant impact on the sustainability of agribusinesses", was supported. This finding suggests that entrepreneurs with superior opportunity recognition, strategic thinking, and decision-making capabilities are better positioned to upgrade value chains, reduce inefficiencies, and exploit market opportunities. The result supports the argument of Sanchez-Garcia et al. (2024) that cognitive capabilities constitute an important foundation for sustainable entrepreneurial outcomes. In the agribusiness context, cognition enables entrepreneurs to interpret changing market signals, adopt innovative practices, and respond effectively to environmental uncertainties.

The strongest direct effect was observed for entrepreneurial subjective norms. The findings show a path coefficient of 0.346, indicating a strong positive relationship between subjective norms and agribusiness sustainability. A t-statistic of 6.620 and a p-value of 0.000

demonstrate that the effect is highly significant. This implies that a 1-unit increase in entrepreneurial subjective norms is associated with a 0.346-unit increase in agribusiness sustainability. The third hypothesis, which states that "entrepreneurial subjective norms have a significant impact on the sustainability of agribusiness", is therefore supported. This finding indicates that social expectations, family influence, community support, and professional networks play a critical role in shaping sustainable agribusiness practices. The result is particularly relevant in developing economies where entrepreneurial activities are often embedded within strong social and community structures. The finding supports the Theory of Planned Behaviour and aligns with Zhang et al. (2019), who argued that social norms significantly influence entrepreneurial decisions and sustainability-related practices. The result further suggests that agribusiness sustainability should not be viewed solely as an individual entrepreneurial outcome but as a socially embedded process influenced by collective expectations and support systems.

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### The Effect of Entrepreneurial Innovation Capability on Agribusiness Sustainability (H4)

The study further revealed that entrepreneurial innovation capability significantly enhances agribusiness sustainability. The findings reveal a coefficient of 0.279, indicating a direct positive relationship, with a t-statistic of 5.308 and a p-value of 0.000, demonstrating that the effect is highly significant. A unit increase in innovation capability enhances sustainability by 0.279 units. Thus, the fourth hypothesis (H4), which states that "entrepreneurial innovation capability has a significant impact on sustainability of agribusinesses", is supported. This finding confirms that innovation capability is a critical strategic resource that enables agribusiness firms to improve product quality, strengthen market competitiveness, reduce post-harvest losses, and achieve value-chain upgrading. The result supports Dynamic Capability Theory, which posits that firms achieve sustainable performance by continuously developing and reconfiguring resources in response to environmental changes.

The significance of entrepreneurial innovation capability is particularly important within the North Central Nigerian agribusiness environment, where firms often operate under severe infrastructural and institutional constraints. Under such conditions, innovation capability enables entrepreneurs to identify alternative production methods, improve processing systems, and exploit emerging market opportunities. The finding corroborates Sanchez-Garcia et al. (2024), Ahimbisibwe et al. (2025), and Otache (2024), who found that innovation capability is a major determinant of competitiveness and long-term sustainability in agribusiness and SME sectors.

### The Effect of Entrepreneurial Psychology on Entrepreneurial Innovation Capability (H5 – H7)

The findings also demonstrated that entrepreneurial self-efficacy, entrepreneurial cognition, and entrepreneurial subjective norms significantly influence innovation capability. Notably, entrepreneurial subjective norms recorded the strongest effect on innovation capability among all the psychological dimensions. This suggests that innovation within agribusiness firms is not solely driven by individual entrepreneurial attributes but is also influenced by social interactions, community expectations, and institutional support structures.

The positive relationship between self-efficacy and innovation capability, with a path coefficient value of 0.154 and a p-value of 0.000, indicates that entrepreneurs who believe in their abilities are more willing to experiment with new ideas, invest in innovative solutions, and embrace technological improvements. This implies that a unit increase in entrepreneurial self-efficacy boosts innovation capability by 0.154 units. The fifth hypothesis, which states that


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"entrepreneurial self-efficacy has a significant impact on entrepreneurial innovation capability", is therefore supported. These results support Zhang et al. (2019) findings, which demonstrated that entrepreneurial confidence is critical in transforming ideas into innovative practices.

Likewise, entrepreneurial cognition enhances entrepreneurial innovation capability (β = 0.146, p = 0.004) by improving entrepreneurs' ability to identify opportunities, process information, and make strategic decisions regarding innovation investments. This suggests that a unit increase in entrepreneurial cognition improves innovation capability by 0.146 units. These findings support Social Cognitive Theory, which emphasizes the importance of cognitive processes and self-beliefs in shaping behavioural outcomes. The result is consistent with Elnadi and Gheith (2021) findings, which revealed that cognitive processes influence the innovative potential of SMEs



The particularly strong effect of subjective norms on entrepreneurial innovation capability provides an interesting insight. The results reveal a coefficient of 0.554, showing a strong positive relationship. With a t-statistic of 11.504 and a p-value of 0.000, the effect is highly significant. This implies that a unit increase in entrepreneurial subjective norms raises innovation capability by 0.554 units. Hence, the seventh hypothesis, which states that "entrepreneurial subjective norms have a significant impact on entrepreneurial innovation capability", is supported. It suggests that agribusiness innovation in developing economies may be socially reinforced through networks, peer influence, community expectations, and collaborative learning. This finding differs from some studies conducted in highly individualistic economies where innovation is primarily driven by individual entrepreneurial characteristics. The findings support Zhang et al. (2019), who showed that entrepreneurial ecosystems driven by norms and social expectations are powerful determinants of innovation. Consequently, the study contributes to the growing literature suggesting that innovation in emerging economies is often socially embedded rather than purely entrepreneur-driven.

**Mediating Effects of Entrepreneurial Innovation Capability (H8 – H10)**

The mediation analysis revealed that entrepreneurial innovation capability partially mediates the relationships between entrepreneurial self-efficacy, entrepreneurial cognition, entrepreneurial subjective norms, and agribusiness sustainability. This finding represents one of the most important contributions of the study. The results indicate that entrepreneurial psychological characteristics do not influence agribusiness sustainability solely through direct behavioural mechanisms; rather, they also operate indirectly through the development of entrepreneurial innovation capability.

The findings revealed a coefficient of 0.043 and a p-value of 0.001, indicating a relationship between entrepreneurial innovation capability, self-efficacy impact, and agribusiness sustainability. Therefore, the eighth hypothesis, which states that "the mediating effect of entrepreneurial innovation capability on entrepreneurial self-efficacy has a significant impact on agribusiness sustainability", is supported. Thus, entrepreneurial innovation capability (EIC) partially mediates the relationships between entrepreneurial self-efficacy and agribusiness sustainability. This implies that this psychological factor influences sustainability both directly and indirectly through innovation capability, reinforcing EIC as an important but not exclusive pathway in the model. This finding tallies with Aliu et al. (2025) and Aliu et al. (2025), who opined that innovation capability strengthens the transition of entrepreneurial resources into sustainable outcomes.

Similarly, the results further show a coefficient of 0.041, with a t-statistic of 2.278 and a p-value of 0.023, indicating a positive, significant, and impactful relationship between entrepreneurial innovation capability, entrepreneurial cognition, and agribusiness sustainability. This means that a percentage increase in entrepreneurial cognition transmitted

via innovation capability may lead to a 0.041 percent increase in agribusiness sustainability. Hence, the ninth hypothesis, which states that "the mediating effect of entrepreneurial innovation capability on entrepreneurial cognition has a significant impact on agribusiness sustainability", is supported. This implies entrepreneurial innovation capability (EIC) partially mediates the relationships between entrepreneurial cognition and agribusiness sustainability. This result is in line with Elnadi and Gheith (2021), who find in a study that cognitive actions have a more visible impact on sustainability when firms possess innovation capability.



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Likewise, the path coefficient of 0.155, along with a t-statistic of 4.729 and a p-value of 0.000, indicates a significant positive indirect effect among entrepreneurial innovation capability, entrepreneurial subjective norms, and agribusiness sustainability. This suggests that entrepreneurial subjective norms improve agribusiness sustainability through innovation capability by 0.155 units. Therefore, the tenth hypothesis, which states that "the mediating effect of entrepreneurial innovation capability on entrepreneurial subjective norms has a significant impact on agribusiness sustainability", is supported. Similarly, entrepreneurial innovation capability (EIC) partially mediates the relationships between entrepreneurial subjective norms and agribusiness sustainability. This implies that this psychological factor influences sustainability both directly and indirectly through innovation capability, reinforcing EIC as an important but not exclusive pathway in the model. This finding supports Olaleye et al. (2024), who highlighted that social norms within agribusiness environments stimulate innovation that enhances sustainability outcomes.

The partial mediation effect suggests that entrepreneurs with stronger self-efficacy, superior cognitive capabilities, and supportive social environments are more likely to develop innovation capabilities, which in turn improve sustainability outcomes through value-chain upgrading, enhanced competitiveness, and operational efficiency. The findings therefore provide empirical support for the integrated application of Social Cognitive Theory and the Theory of Planned Behaviour. While Social Cognitive Theory explains how self-efficacy and cognition influence innovative behaviour, the Theory of Planned Behaviour explains how social pressures and normative expectations shape entrepreneurial actions. Innovation capability serves as the mechanism through which these psychological resources are transformed into sustainable agribusiness outcomes.

The findings further imply that policies aimed at promoting agribusiness sustainability should extend beyond financial support and infrastructure provision. Policymakers should also prioritize entrepreneurial training, innovation-oriented capacity building, mentorship programmes, and social support systems that strengthen both entrepreneurial psychology and innovation capability. Such interventions are likely to generate more sustainable outcomes than programmes that focus exclusively on financial or technological support.

## Conclusion

The findings from the PLS-SEM analysis demonstrate a statistically significant and positive relationship between entrepreneurial factors and agribusiness sustainability in North Central Nigeria. Specifically, entrepreneurial subjective norms emerged as the strongest direct predictor of agribusiness sustainability, followed by innovation capability, entrepreneurial cognition, and entrepreneurial self-efficacy. These results highlight the combined influence of the individual, cognitive, and social dimensions of entrepreneurship on sustainable agribusiness outcomes.

The mediating role of entrepreneurial innovation capability was also confirmed. The indirect effects of entrepreneurial self-efficacy, entrepreneurial cognition, and entrepreneurial subjective norms (through entrepreneurial innovation capability were all statistically


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significant. This indicates that innovation capability not only strengthens direct relationships but also channels the effects of entrepreneurial traits and social norms towards agribusiness sustainability outcomes.

The overall model yielded an adjusted $R^2$ of 0.583 for agribusiness sustainability and 0.552 for entrepreneurial innovation capability, indicating that the entrepreneurial constructs collectively explain 58.3% of the variation in sustainability and 55.2% of the variance in innovation capability. The high t-statistics and very low p-values affirm the reliability and robustness of the model. These results underscore the critical importance of entrepreneurial psychology and innovative practices in enhancing the sustainability, resilience, and competitiveness of agro-processing firms operating in resource-constrained environments.



Theoretically, this study supports the application of endogenous growth theory by demonstrating that sustainability outcomes are driven by internal capabilities such as innovation, human capital, and entrepreneurial orientation. In the agribusiness context, entrepreneurial innovation capability is a key enabler of value creation, efficiency, and long-term sustainability.

Although the study is empirically situated in North Central Nigeria, the insights extend to similar agribusiness systems in emerging and developing economies, particularly in Asia, where firms operate under comparable institutional and infrastructural constraints. As such, the findings contribute to ongoing discussions on inclusive socio-economic development, SME competitiveness, and innovation-led agribusiness transformation, which are central to policy and business strategy in these regions.

## Policy and Practical Implications

This study provides policy and practical implications. First, capacity-building programs should be designed to enhance entrepreneurial self-efficacy through training, mentorship, and experience-sharing among agro-processing firms. Second, policy interventions should focus on strengthening entrepreneurial cognition through access to market information, digital tools, and innovation hubs that facilitate opportunity recognition. Third, community and cultural support systems (subjective norms) should be leveraged to encourage collaboration, networking, and shared values that promote sustainability in agribusiness. Fourth, Investment in innovation capability should be prioritized by both government and private stakeholders, including funding for technology adoption, product development, and process improvement. Finally, future studies could examine moderating or contextual variables (such as firm size, type of agro-processing activity, or access to finance) to further refine the understanding of how entrepreneurial factors and innovation capability jointly influence agribusiness sustainability outcomes in North Central Nigeria across different institutional contexts.

## Limitations of the Study

This study was solely undertaken to examine the effect of entrepreneurial psychology on agribusiness sustainability, with a particular focus on the mediating effect of entrepreneurial innovation capability on entrepreneurial self-efficacy, entrepreneurial cognition, entrepreneurial subjective norms, and agribusiness sustainability. Although the study provides valuable insights into the relationships among entrepreneurial psychology, innovation capability, and agribusiness sustainability, its cross-sectional design limits the ability to establish definitive causal relationships among the variables. Future studies may employ longitudinal research designs to examine how entrepreneurial psychological attributes and innovation capability evolve over time and influence agribusiness sustainability. Such approaches would provide stronger evidence regarding the direction and stability of the observed relationships.

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