

Review

Sustainable Agricultural Entrepreneurship in Assam: Trends, Challenges, and Research Gaps

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Abstract:

Sustainable agricultural entrepreneurship has emerged as a critical pathway for addressing agrarian distress, environmental degradation, and rural livelihood vulnerability in developing regions. Assam, characterised by ecological fragility, smallholder dominance, and limited industrial diversification, presents a unique context for examining sustainability-oriented agripreneurship. This paper undertakes an extensive literature review of published research to synthesise existing knowledge on sustainable agricultural entrepreneurship in Assam. Drawing on studies from agricultural economics, entrepreneurship, sustainability science, and rural development, the paper analyses dominant trends, structural and contextual challenges, and persistent research gaps. The review reveals that agripreneurship in Assam is predominantly necessity-driven and resilience-oriented, with sustainability functioning more as an adaptive strategy than as a source of competitive advantage. Institutional constraints, environmental risks, and limited innovation ecosystems continue to restrict agripreneurial transformation. The paper concludes by identifying critical theoretical, methodological, and policy-oriented research gaps and proposes directions for advancing sustainability-driven agripreneurship research in Assam and comparable peripheral agrarian regions.

Keywords: *Agripreneurship; Sustainable Entrepreneurship; Assam; Agricultural Innovation; Rural Development*

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1. Introduction

Agricultural entrepreneurship has emerged as a critical pathway for achieving sustainable rural development, particularly in developing and agrarian economies where agriculture continues to support a large proportion of livelihoods (Pato & Teixeira, 2016; Dias, Rodrigues, & Ferreira, 2019). The growing convergence of entrepreneurship and sustainability discourses has led to the recognition of sustainable agricultural entrepreneurship, or agripreneurship, as a mechanism that simultaneously addresses economic viability, environmental stewardship, and social inclusion (Dean & McMullen, 2007; Schaltegger, Hansen, & Lüdeke-Freund, 2016). Within this framework, agripreneurs are increasingly viewed not merely as producers, but as innovators and agents of rural

transformation operating within complex ecological and institutional systems (Lans, Blok, & Wesselink, 2017; Knickel et al., 2018).

Globally, research on sustainable agripreneurship has expanded significantly over the past two decades, with studies examining innovation adoption, value-chain integration, resilience building, and institutional support mechanisms (Parrish, 2010; Muñoz & Cohen, 2018; Dias et al., 2019). However, the spatial distribution of this scholarship remains uneven, with a strong concentration on developed economies and relatively limited attention to peripheral, ecologically vulnerable, and institutionally constrained regions (Knickel et al., 2018; Pato & Teixeira, 2016).

India's North-Eastern region, and Assam in particular, presents a distinct agripreneurial context that warrants focused scholarly attention. Assam's agrarian economy is characterised by small and marginal landholdings, high dependence on monsoon-based agriculture, recurrent flooding, soil erosion, and limited industrial diversification (Das, 2018; Ahmed & Choudhury, 2020). These structural and ecological constraints significantly influence entrepreneurial behaviour, pushing farmers toward livelihood-oriented and necessity-driven forms of entrepreneurship rather than opportunity-driven, innovation-intensive ventures (Goswami & Bhattacharyya, 2016; Nath & Deka, 2020). As a result, sustainability in Assam's agripreneurial landscape often manifests as an adaptive response to vulnerability rather than as a deliberate strategic orientation aligned with global sustainability markets (Parrish, 2010; Schaltegger et al., 2016).

Despite policy emphasis on entrepreneurship promotion, organic farming, and climate-resilient agriculture in Assam, academic research remains fragmented and conceptually underdeveloped (Dutta & Neog, 2021; Singh et al., 2021). Existing studies are scattered across disciplines such as agricultural economics, rural development, sociology, and environmental studies, with limited theoretical integration into mainstream entrepreneurship and sustainability literature (Muñoz & Cohen, 2018; Lans et al., 2017). Moreover, much of the empirical work is descriptive, case-based, and context-specific, offering limited cumulative insight into broader patterns, drivers, and outcomes of sustainable agricultural entrepreneurship in the state (Goswami & Bhattacharyya, 2016; Nath & Deka, 2020).

Given this fragmented knowledge base, there is a clear need for a comprehensive, theory-informed literature review that consolidates existing research on sustainable agricultural entrepreneurship in Assam. By synthesising published research, a structured review can provide a clearer understanding of how sustainability is conceptualised and operationalised within Assam's agripreneurial ecosystem.

Accordingly, this paper undertakes an in-depth literature review of published academic research on sustainable agricultural entrepreneurship in Assam, with three specific objectives. First, it seeks to identify and synthesise dominant trends in agripreneurial activities and sustainability practices

reported in the literature. Second, it examines the structural, environmental, and institutional challenges that constrain the growth and sustainability of agripreneurship in the state. Third, it highlights critical research gaps and future directions, thereby contributing to theory development and informing policy-relevant research agendas (Schaltegger et al., 2016; BIRTHAL et al., 2019).

By focusing exclusively on secondary sources, this paper positions itself as a knowledge-integrating study rather than an empirical investigation. The insights generated are expected to be valuable for researchers, policymakers, and development practitioners seeking to design context-sensitive strategies for promoting sustainable agricultural entrepreneurship in ecologically and institutionally fragile regions such as Assam.

2. Conceptual and Theoretical Foundations of Sustainable Agricultural Entrepreneurship

The concept of sustainable agricultural entrepreneurship is rooted in the convergence of entrepreneurship theory, sustainability science, and agricultural economics. Traditionally, entrepreneurship research focused on opportunity recognition, innovation, and profit maximisation (Schumpeter, 1934; Shane & Venkataraman, 2000). However, with rising ecological degradation, climate change, and rural livelihood challenges, scholars have increasingly emphasised sustainability as an integral dimension of entrepreneurial activity (Dean & McMullen, 2007; Cohen & Winn, 2007).

In the agricultural context, sustainable entrepreneurship extends beyond farm-level innovation to include value-chain integration, diversification, institutional embeddedness, and community resilience (Lans et al., 2017; Dias, Rodrigues, & Ferreira, 2019). Sustainability in agripreneurship therefore encompasses environmental stewardship (soil conservation, biodiversity protection), social inclusion (employment generation, gender participation), and economic viability (Parrish, 2010; Schaltegger, Hansen, & Lüdeke-Freund, 2016).

However, scholars caution that sustainability-oriented entrepreneurship manifests differently across regions and development contexts. In developed economies, sustainability is often driven by innovation, consumer demand, and regulatory pressure (Schaltegger & Wagner, 2011; Bocken et

al., 2014). In contrast, in developing and peripheral regions, sustainability frequently emerges as a necessity-driven adaptive response to structural constraints rather than as a proactive strategic choice (Alvarez & Barney, 2014; Muñoz & Cohen, 2018). This distinction is critical for understanding agripreneurship in Assam.

Institutional theory provides further explanatory depth for analysing sustainable agricultural entrepreneurship in regions like Assam. In agrarian regions characterised by small landholdings, weak infrastructure, and policy dependency, institutional arrangements strongly influence entrepreneurial capacity and sustainability outcomes (BIRTHAL et al., 2019; Singh, Singh, & Kumar, 2021). Studies on Indian agripreneurship highlight that access to credit, extension services, cooperatives, and government programmes plays a decisive role in shaping entrepreneurial trajectories.

The sustainable livelihoods framework further complements this perspective by emphasising how households combine natural, financial, human, social, and physical capital to cope with vulnerability and pursue livelihood strategies. Several studies on Assam and North-East India implicitly draw on this framework, showing that agripreneurship often functions as a livelihood diversification strategy rather than a growth-oriented business model (Goswami & Bhattacharyya, 2016; Das, 2018). Flood-prone ecosystems, land fragmentation, and market isolation compel agripreneurs to prioritise risk reduction and income stability over expansion and innovation (Ahmed & Choudhury, 2020; Nath & Deka, 2020).

More recent literature integrates innovation systems theory into agricultural entrepreneurship research. Knickel et al. (2018) argue that sustainable agricultural innovation is co-created through networks involving farmers, researchers, institutions, and markets. However, empirical studies from Assam indicate limited integration of agripreneurs into formal innovation systems, resulting in low technology adoption and weak knowledge diffusion (Dutta & Neog, 2021; Singh et al., 2021). This gap underscores the need to contextualise innovation-led sustainability models within regional institutional realities.

Overall, the conceptual foundations suggest that sustainable agricultural entrepreneurship in Assam cannot be adequately explained using mainstream

entrepreneurship models alone. Instead, it requires an integrated framework that combines sustainability-driven entrepreneurship theory, institutional analysis, and livelihood perspectives. Such an approach enables a more nuanced understanding of why sustainability in Assam's agripreneurship ecosystem is predominantly adaptive, resilience-oriented, and context-specific rather than innovation-led or market-driven.

3. Review Methodology

This paper adopts a qualitative, narrative-thematic literature review methodology, relying exclusively on secondary data from published research. The review focuses on peer-reviewed journal articles, edited book chapters, doctoral theses, and authoritative institutional reports relevant to sustainable agricultural entrepreneurship in Assam. Major academic databases such as Scopus, Web of Science, JSTOR, and Google Scholar were systematically searched using combinations of keywords including "agripreneurship," "agricultural entrepreneurship," "sustainable agriculture," "sustainable entrepreneurship," "Assam," and "North-East India." Additional sources were identified through backward citation tracking of seminal papers.

Inclusion criteria were: (i) empirical or conceptual relevance to agricultural entrepreneurship and/or sustainability, (ii) explicit or implicit focus on Assam or comparable North-Eastern contexts, and (iii) publication in credible academic or institutional outlets.

The selected literature was analysed thematically to identify recurring patterns related to trends, challenges, conceptual frameworks, and methodological approaches. Rather than aiming for statistical aggregation, the review seeks interpretive depth and conceptual synthesis, consistent with established approaches to literature-based research in management and social sciences (Tranfield et al., 2003).

4. Trends in Sustainable Agricultural Entrepreneurship in Assam

The existing body of literature reveals that sustainable agricultural entrepreneurship in Assam has evolved in a context-specific manner, shaped by ecological vulnerability, socio-economic constraints, and institutional interventions. Unlike agripreneurship models in advanced agricultural economies, where sustainability is often pursued as

a strategic market positioning tool, agripreneurship in Assam largely reflects adaptive and survival-oriented entrepreneurship (Goswami & Bhattacharyya, 2016; Das, 2018; Nath & Deka, 2020).

4.1 Dominance of Resource-Based and Nature-Embedded Enterprises

A prominent trend identified across multiple studies is the dominance of resource-based agripreneurial activities. Fisheries, livestock rearing, horticulture, sericulture, organic farming, and allied agricultural activities constitute the primary entrepreneurial domains in Assam (Dutta & Neog, 2021; Nath & Deka, 2020; Ahmed & Choudhury, 2020). These enterprises are deeply embedded in local ecological conditions and traditional livelihood practices, reflecting what Pretty (2008) describes as “ecological embeddedness” of rural enterprises.

Several studies note that the prevalence of small and marginal landholdings has limited the scope for large-scale commercial agriculture, thereby encouraging diversification into allied and supplementary agricultural enterprises (BIRTHAL et al., 2019; Singh et al., 2021). Fisheries and livestock-based entrepreneurship, in particular, have gained prominence due to Assam’s abundant water resources and favourable agro-climatic conditions (Das, 2018; Goswami & Bhattacharyya, 2016). This trend aligns with broader national observations that diversification enhances farm income stability and resilience in risk-prone regions.

4.2 Gradual Shift towards Sustainability-Oriented Practices

Another significant trend evident in the literature is the gradual adoption of sustainability-oriented agricultural practices. Studies report increasing engagement with organic farming, low-chemical input agriculture, integrated farming systems, and community-based natural resource management (Ahmed & Choudhury, 2020; Dutta & Neog, 2021). However, scholars consistently argue that such practices in Assam are driven more by necessity and ecological compulsion than by conscious sustainability strategies (Goswami & Bhattacharyya, 2016; Das, 2018).

Flood-prone districts of Assam, for instance, demonstrate higher adoption of low-input and climate-adaptive practices, as repeated exposure to environmental shocks discourages dependence on costly chemical inputs (Ahmed & Choudhury, 2020).

Despite these developments, the literature cautions that sustainability adoption remains uneven and fragmented. Nath and Deka (2020) observe that while awareness of sustainable practices has increased, market incentives, certification mechanisms, and value-chain integration remain weak, limiting the commercial viability of sustainable agripreneurial ventures.

4.3 Role of Institutional and Policy-Driven Entrepreneurship

Institutional interventions constitute a critical trend shaping agripreneurship in Assam. Numerous studies highlight the influence of government schemes, self-help groups (SHGs), farmer producer organisations (FPOs), and cooperative models in facilitating agripreneurial activity (BIRTHAL et al., 2019; Singh et al., 2021; Dutta & Neog, 2021). Programs focusing on rural livelihoods, agricultural diversification, and micro-enterprise development have played a significant role in encouraging entrepreneurship among smallholders.

However, scholars argue that such institution-led agripreneurship often results in dependency-driven enterprises rather than innovation-led ventures (Goswami & Bhattacharyya, 2016; Das, 2018). The emphasis on subsidy-based models and short-term income generation limits entrepreneurial autonomy and long-term sustainability. This observation resonates with North’s institutional theory, which suggests that weak institutional frameworks constrain entrepreneurial incentives and innovation capacity.

4.4 Limited Technological and Market-Led Innovation

The literature consistently reports a low level of technological innovation and market-oriented entrepreneurship in Assam’s agricultural sector. While national-level studies emphasise digital agriculture, agri-startups, and value-chain integration, Assam-specific research indicates limited diffusion of such innovations (Nath & Deka, 2020; Dutta & Neog, 2021). Factors such as poor infrastructure, limited access to finance, low digital literacy, and inadequate extension services restrict innovation uptake (BIRTHAL et al., 2019; Singh et al., 2021).

As a result, agripreneurship in Assam remains predominantly production-oriented rather than market-oriented. Value addition, branding, and direct market linkages are relatively underdeveloped, constraining income enhancement

and enterprise scalability (Goswami & Bhattacharyya, 2016; Ahmed & Choudhury, 2020).

4.5 Emerging Focus on Youth and Women Agripreneurship

An emerging, though still under-developed, trend in the literature is the growing policy and academic interest in youth and women agripreneurship. Studies acknowledge the potential of agripreneurship to address rural youth unemployment and women's economic empowerment (Lans et al., 2017; Muñoz & Cohen, 2018). However, Assam-specific research on these dimensions remains sparse and largely descriptive (Nath & Deka, 2020).

Where examined, women-led agripreneurial activities are often confined to small-scale, informal, and home-based enterprises, constrained by limited access to land, credit, and markets (Goswami & Bhattacharyya, 2016; Das, 2018). This highlights a significant gap between policy intent and empirical outcomes in the region.

5. Challenges Constraining Sustainable Agricultural Entrepreneurship in Assam

The literature consistently demonstrates that sustainable agricultural entrepreneurship in Assam operates under a complex web of ecological, institutional, economic, and socio-cultural constraints. Unlike opportunity-driven agripreneurship observed in more developed agrarian regions, agripreneurship in Assam is largely shaped by structural vulnerabilities that restrict innovation intensity, scalability, and long-term sustainability (Goswami & Bhattacharyya, 2016; Das, 2018; Nath & Deka, 2020). These challenges are not isolated but mutually reinforcing, creating what several scholars describe as a "low-equilibrium entrepreneurial trap" in peripheral agrarian economies (BIRTHAL et al., 2019; Singh et al., 2021).

5.1 Environmental and Climatic Vulnerability

Environmental vulnerability emerges as the most dominant constraint in Assam's agripreneurial ecosystem. Assam is one of India's most flood-prone states, with recurrent floods, riverbank erosion, and increasing climate variability significantly disrupting agricultural production systems (Das, 2018; Ahmed & Choudhury, 2020). Studies indicate that repeated crop losses reduce farmers' willingness to invest in innovation, thereby reinforcing risk-averse entrepreneurial behaviour (BIRTHAL et al., 2019; Pretty, 2008).

Climate-induced uncertainty also limits the adoption of long-term sustainability practices. While organic farming, integrated farming systems, and low-input agriculture are often promoted as sustainable solutions, empirical studies reveal that agripreneurs adopt such practices primarily to minimise input costs rather than to pursue environmental innovation (Goswami & Bhattacharyya, 2016; Nath & Deka, 2020).

5.2 Institutional and Policy Constraints

A significant body of literature highlights institutional weakness as a critical barrier to sustainable agripreneurship in Assam. Although multiple government schemes aim to promote agripreneurship such as the National Livelihood Mission, Rashtriya Krishi Vikas Yojana, and Start-up India their impact remains uneven due to fragmented implementation and limited local institutional capacity (BIRTHAL et al., 2019; Singh et al., 2021).

Research suggests that policy frameworks often emphasise enterprise creation without adequate focus on capability building, innovation mentoring, and sustainability outcomes (Lans et al., 2017; Dias et al., 2019). Extension systems in Assam continue to follow a production-centric approach, offering limited support for value addition, market integration, or sustainability-oriented innovation (Nath & Deka, 2020; Dutta & Neog, 2021).

5.3 Market Access and Value Chain Limitations

Market-related constraints significantly restrict the growth and sustainability of agricultural enterprises in Assam. Several studies document weak market linkages, absence of organised value chains, and high transaction costs as persistent challenges for agripreneurs (Goswami & Bhattacharyya, 2016; Singh et al., 2021). Poor transportation infrastructure and limited storage facilities exacerbate post-harvest losses, particularly for perishable products such as fruits, vegetables, fish, and dairy (Das, 2018; Nath & Deka, 2020).

The literature also notes that sustainability-oriented products such as organic produce fail to fetch price premiums due to limited consumer awareness, weak certification mechanisms, and fragmented markets (Pretty, 2008; Dutta & Neog, 2021). As a result, agripreneurs are unable to translate sustainability practices into economic returns, discouraging further innovation investment.

5.4 Human Capital and Innovation Capability Constraints

Human capital limitations constitute another major barrier to sustainable agripreneurship in Assam. Studies consistently report low levels of formal education, limited entrepreneurial training, and weak exposure to innovation ecosystems among agripreneurs (Nath & Deka, 2020; Lans et al., 2017). This constrains opportunity recognition, technology adoption, and strategic business planning.

Innovation in Assam's agripreneurship context is largely incremental and experience-based rather than technology-driven or research-led (Goswami & Bhattacharyya, 2016; Dutta & Neog, 2021). The absence of agribusiness incubators, weak university–industry linkages, and limited collaboration with research institutions further restrict innovation diffusion (Dias et al., 2019; Knickel et al., 2018).

5.5 Social and Demographic Constraints

Social structures and demographic trends also shape the sustainability of agripreneurship in Assam. Gendered access to land, finance, and markets limits women's participation in agripreneurial decision-making, despite their significant involvement in agricultural labour (Muñoz & Cohen, 2018; Lans et al., 2017). Similarly, youth outmigration reduces the availability of skilled labour and weakens the long-term entrepreneurial base in rural areas (Singh et al., 2021).

The literature suggests that social norms and cultural perceptions often discourage risk-taking and innovation, reinforcing subsistence-oriented entrepreneurial behaviour (Parrish, 2010; Goswami & Bhattacharyya, 2016). These socio-cultural constraints interact with institutional and environmental challenges, creating a cumulative disadvantage for sustainability-driven agripreneurs.

6. Discussion and Analytical Synthesis

The reviewed literature collectively indicates that sustainable agricultural entrepreneurship in Assam follows a distinct development trajectory when compared with mainstream agripreneurship models discussed in global sustainability and entrepreneurship research. While international literature often frames sustainable entrepreneurship as opportunity-driven, innovation-oriented, and market-embedded (Dean & McMullen, 2007; Schaltegger & Wagner, 2011; Cohen & Winn, 2007), evidence from Assam reflects a necessity-driven, resilience-oriented, and contextually constrained form of agripreneurship (Goswami &

Bhattacharyya, 2016; Das, 2018; Nath & Deka, 2020).

6.1 Sustainability as Adaptation Rather Than Strategic Innovation

A key analytical insight emerging from the literature is that sustainability in Assam's agripreneurship ecosystem is rarely pursued as a deliberate strategic objective. Instead, sustainable practices such as organic farming, low-input agriculture, mixed cropping, and community-based resource use are primarily adaptive responses to ecological vulnerability and resource scarcity (Pretty, 2008; Ahmed & Choudhury, 2020; Dutta & Neog, 2021). This contrasts sharply with sustainability-driven business model innovation observed in developed agrarian economies, where environmental responsibility often aligns with premium markets and competitive differentiation (Parrish, 2010; Schaltegger et al., 2016).

6.2 Role of Institutions and Policy Dependency

Another prominent theme in the discussion is the centrality of institutions in shaping agripreneurial outcomes. Numerous studies emphasise the heavy dependence of agripreneurs in Assam on government schemes, subsidies, self-help groups (SHGs), and cooperative structures (Goswami & Bhattacharyya, 2016; Singh et al., 2021). While institutional support has enabled enterprise entry, the literature suggests that it has not sufficiently fostered innovation, scalability, or long-term sustainability. This institutional dependency aligns with insights from institutional entrepreneurship theory, which posits that weak institutional environments constrain entrepreneurial agency and limit experimentation (North, 1990; Pacheco et al., 2010). In Assam, policy interventions appear to prioritise enterprise creation over enterprise evolution, resulting in a proliferation of small, survival-oriented agribusinesses with limited growth trajectories (Birthal et al., 2019; Nath & Deka, 2020).

6.3 Innovation Deficit and Knowledge Gaps

Despite frequent references to “innovation” in policy discourse and academic narratives, the literature reveals a significant innovation deficit within Assam's agripreneurship ecosystem. Most enterprises rely on traditional production methods, incremental process improvements, or indigenous knowledge systems rather than technological or organisational innovations (Pretty, 2008; Knickel et al., 2018; Dutta & Neog, 2021).

This gap can be attributed to multiple reinforcing factors identified across studies: limited access to extension services, low exposure to markets, inadequate entrepreneurial education, and absence of agribusiness incubation infrastructure (Nath & Deka, 2020; Singh et al., 2021). Consequently, sustainability remains largely practice-based rather than innovation-driven, restricting the transformative potential of agripreneurship in the region.

6.4 Social Dimensions: Gender and Youth

The discussion also highlights persistent social asymmetries within sustainable agripreneurship research and practice. While women play a substantial role in agriculture and allied activities in Assam, their entrepreneurial contributions remain under-documented and under-theorised (Lans et al., 2017; Muñoz & Cohen, 2018).

Similarly, youth participation in agripreneurship is often framed as a policy aspiration rather than an empirically grounded phenomenon. The literature indicates that educated rural youth continue to view agriculture as a low-return, high-risk sector, reinforcing migration trends and limiting innovation infusion into agripreneurship (Nath & Deka, 2020; Singh et al., 2021).

7. Research Gaps and Future Research Directions

A critical synthesis of the existing literature reveals several conceptual, methodological, contextual, and policy-oriented research gaps in the study of sustainable agricultural entrepreneurship in Assam. Despite increasing academic and policy attention, the field remains fragmented and under-theorised, especially when evaluated against Scopus-level international scholarship on sustainable entrepreneurship and agripreneurship.

7.1 Conceptual and Theoretical Gaps

One of the most prominent gaps lies in the limited application of established entrepreneurship and sustainability theories. A majority of studies on Assam and the North-East region are descriptive or exploratory, focusing on profiles of agripreneurs, income generation, or livelihood outcomes (Goswami & Bhattacharyya, 2016; Nath & Deka, 2020). There is minimal engagement with theoretical frameworks such as sustainable entrepreneurship theory (Dean & McMullen, 2007), triple bottom line (Elkington, 1997), institutional theory (North, 1990), or innovation systems theory (Lundvall, 1992).

Further, sustainability is often treated as an implicit outcome rather than an explicitly theorised construct. Studies rarely differentiate between environmental, social, and economic sustainability, nor do they examine trade-offs among these dimensions (Schaltegger, Hansen, & Lüdeke-Freund, 2016; Muñoz & Cohen, 2018). This limits conceptual clarity and reduces comparability with global research on sustainability-oriented entrepreneurship.

7.2 Methodological Gaps

Methodologically, the literature is heavily skewed toward cross-sectional, qualitative, and small-sample studies. While case studies and field-based surveys provide valuable contextual insights (Das, 2018; Ahmed & Choudhury, 2020), there is a notable absence of:

- ❖ Large-scale quantitative analyses
- ❖ Longitudinal studies tracking enterprise evolution
- ❖ Mixed-method designs integrating economic, environmental, and social indicators

Very few studies employ advanced analytical tools, such as structural equation modelling, panel data analysis, or sustainability indices, which are common in Scopus-indexed agripreneurship research (Pato & Teixeira, 2016; Dias et al., 2019). Moreover, there is limited use of secondary macro-level datasets (e.g., NSSO, Agricultural Census, NABARD reports) to examine regional patterns, institutional effectiveness, and policy outcomes. Future research should prioritise longitudinal and quantitative approaches to assess sustainability outcomes over time and strengthen the empirical rigor of the field.

7.3 Innovation-Centric Research Gaps

Although innovation is frequently mentioned in policy documents and conceptual discussions, empirical research on innovation processes in Assam's agripreneurship ecosystem remains weak. Most studies equate innovation with organic farming or diversification without analysing:

- ❖ Types of innovation (process, product, organisational, market)
- ❖ Diffusion mechanisms
- ❖ Role of technology, digital platforms, and agri-tech startups

In contrast, global literature emphasises innovation systems, knowledge networks, and entrepreneurial ecosystems as drivers of sustainable agripreneurship

(Knickel et al., 2018; Lans et al., 2017). Such perspectives are largely absent in Assam-focused studies.

Future studies should investigate how innovation emerges under constraints, the role of indigenous knowledge, and the interaction between traditional practices and modern technologies.

7.4 Social Inclusion and Demographic Gaps

Another critical gap concerns gender and youth dimensions of sustainable agripreneurship. While women's participation through self-help groups is often acknowledged, rigorous analysis of women-led agripreneurial sustainability outcomes is scarce (Nath & Deka, 2020). Similarly, youth agripreneurship is discussed more as a policy aspiration than as an empirically grounded phenomenon.

The intersection of gender, sustainability, and entrepreneurship well-developed in international research (Muñoz & Cohen, 2018; Kabeer, 2012) remains underexplored in the Assam context. Future research should adopt intersectional and inclusive frameworks to analyse how access to resources, institutions, and innovation differs across social groups.

7.5 Policy and Institutional Research Gaps

While many studies highlight government schemes and institutional support, systematic evaluations of policy effectiveness are rare. Existing research often lists schemes without assessing their long-term sustainability impacts or entrepreneurial outcomes (Birthal et al., 2019; Singh et al., 2021).

There is also a lack of comparative analysis between Assam and other Indian states or international regions facing similar ecological vulnerabilities.

Future research should focus on:

- ❖ Policy impact assessments
- ❖ Comparative regional studies
- ❖ Institutional ecosystem analysis

Such work would bridge the gap between policy intent and empirical outcomes.

8. Conclusion

This review demonstrates that sustainable agricultural entrepreneurship in Assam is largely necessity-driven, shaped by ecological vulnerability, fragmented landholdings, and limited institutional support. Sustainability practices in the region primarily serve as adaptive strategies to manage environmental and livelihood risks rather than as deliberate innovation-driven initiatives (Dean &

McMullen, 2007; Parrish, 2010; Knickel et al., 2018).

Incremental innovation, local knowledge, and resource-efficient practices dominate, while structural barriers such as inadequate finance, weak market linkages, and gendered access constraints limit enterprise growth and scalability (Birthal et al., 2019; Singh et al., 2021; Buragohain & Deka, 2018). Policy and institutional interventions should focus on context-sensitive support, integrating skill development, market facilitation, and ecological resilience to enhance both economic and environmental sustainability. Further research is needed to quantitatively assess sustainability outcomes, examine youth and women participation, and explore comparative regional dynamics. In essence, Assam's agripreneurship ecosystem reflects a dynamic interplay of adaptation, resourcefulness, and resilience, offering valuable lessons for promoting sustainable, inclusive, and innovative agricultural development in ecologically fragile regions.

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