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The Contribution of Sustainable Agricultural Innovations to Inclusive Development: An Examination of Indian Farming Communities

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Abstract: Agriculture remains the backbone of rural livelihoods and socio-economic progress in India, yet persistent income disparities, unequal access to resources, and limited institutional participation continue to impede inclusive growth, particularly for smallholders, women, and marginalised communities. This study critically examines the contribution of sustainable agricultural innovations (SAIs) to inclusive development among farming communities in Punjab, Maharashtra, and Karnataka, employing a mixed-methods approach. The research is carried out on primary data from 360 farmers, focus group discussions, key informant interviews, secondary reports and field observations. The analysis focuses on how the adoption of SAIs, including bio-inputs, precision irrigation, digital advisory platforms, and community-based models such as Self-Help Groups (SHGs) and Farmer Producer Organisations (FPOs), influences income equality, institutional inclusion, access to agricultural services, and empowerment.

Findings reveal that farmers who adopt multiple innovations experience significantly higher incomes, improved access to credit and extension services, and enhanced participation in local institutions. Community-driven models, particularly SHGs and FPOs, play a pivotal role in facilitating the diffusion of innovations and fostering collective bargaining power, especially among women and marginalised groups. However, the study also identifies persistent barriers to widespread adoption, including limited awareness, insecure land tenure, lack of technical knowledge, and social exclusion, which affect the adoption significantly. These barriers underscore the importance of context-specific strategies and supportive policy frameworks to ensure equitable access and participation.

The research further highlights that the success of SAIs is highly context-dependent, shaped by local socio-economic conditions, institutional structures, and the adaptability of innovations to diverse agro-ecological settings. While technological advancements such as digital platforms and solar-powered irrigation have demonstrated potential to bridge information and resource gaps, their impact is maximised when integrated with participatory, community-led approaches. The study concludes that sustainable agricultural innovations hold substantial commitment for advancing inclusive development. However, their transformative potential can only be fully realised through targeted capacity-building, robust grassroots institutions, and enabling policy environments that prioritise the needs of marginalised farmers.

These insights provide guidance for policymakers, development practitioners, and researchers seeking to design and implement equitable agricultural innovation systems. By foregrounding both the opportunities and challenges inherent in the adoption of SAIs, this study contributes to the ongoing discourse on sustainable and inclusive rural transformation in India, emphasising the need for holistic, locally tailored interventions to achieve lasting social and economic equity in the agricultural sector.

Keywords: Agricultural service access, inclusive development, innovation adoption barriers, regional disparities. Sustainable agricultural innovations,

Introduction

India's economy and society have long been heavily reliant on agriculture. However, as the country progresses on the path of industrialisation and urbanisation, agriculture remains the occupation of close to 45% of its population and contributes approximately 18% to the national Gross Value Added (GVA) (Economic Survey of India, 2023). Agriculture is also a livelihood to millions of rural families, especially small and marginal farmers, landless labourers, women and the tribal population. However, the industry has a number of hurdles to overcome, such as decreasing soil health, water issues brought on by climate change, crop failure due to climate change and market volatility. These issues are further exacerbated by structural inequalities in land ownership, access to credit, inputs, and markets – factors which more strongly impede the marginalised rural populations.

To meet these complex, interlinked challenges, sustainable agricultural innovations are incorporated as important tools. These innovations are new practices, technologies and systems that increase productivity; conserve resources and support long-term environmental, economic, and social sustainability. They include climate-smart agriculture, organic and regenerative farming, integrated pest and nutrient management, micro irrigation techniques like drop and sprinkler technologies, farm tools running on renewable energy and digital platforms for advisory services and market access. Such innovations have a goal that goes beyond increasing farm productivity to, ultimately, building resilience, reducing reliance on chemical inputs and the proliferation of monocultures, and increasing the efficient use of inputs by farmers.

Parallel to this, the idea of inclusive development has become increasingly prominent as a definitive objective of economic and social policies. Definition: Inclusive development is growth that generates pervasive participation, equitable access to resources and opportunities, and protection of all beneficiaries and resources, especially those that have been historically neglected or marginalised. In agriculture, it means that all farmers, regardless of caste, class, gender, scale, or location of operation, have equitable access to innovations, markets, knowledge, and policy benefits. It is about increasing the ability and enabling the disempowered to engage meaningfully in development.

The linkage of sustainable agricultural innovations to conducive development is important yet underdeveloped. While innovations are frequently considered to promote progress, they are not guaranteed to result in inclusive gains unless they are deliberately designed and implemented to achieve this goal. For example, tools that enable precision farming may effectively raise productivity but disconnect smallholders either because they are too costly or because they require a certain level of digital literacy. On the other hand, low-cost innovations, such as community-driven initiatives like farmer cooperatives or natural farming practices, are likely to target underserved populations more effectively. It is, therefore, crucial to explore how sustainable agricultural innovations facilitate inclusivity (in terms of access, impact, and empowerment) to inform policy and programme development for an equitable rural transformation.

Additionally, not all innovative efforts have the same effects in various locales and communities. The success of innovations often depends on the context, which includes factors as socio-economics, institutional structure, adaptation, and farmers' knowledge of them. There is an emerging understanding that inclusive innovation should be locally relevant, participatory, and that it depends on supportive infrastructure and policies.

However, a lot of the literature around agricultural innovation has tended to emphasise productivity increases and environmental effects, looking less at this dimension of inclusiveness. Empirical studies that systematically consider the inclusive impacts of sustainable innovations in rural Indian settings are few in number. This gap highlights the importance of the development of evidence-based research to guide innovation policies that are both sustainable and socially just.

Research Objectives

According to the research questions raised, the aims of this study are as follows:

- To investigate the extent to which sustainable agricultural innovations contribute to inclusive development in Indian farming communities.
- To determine what type of sustainable innovations are most successful in fostering equitable outcomes with potential significance for marginalised farmers rural populations.

These aims to seek to understand the mechanisms that will ensure that agricultural system innovation can deliver not just environmental sustainability and productivity, but also social inclusion, equity, and empowerment. The results

will provide evidence for policymakers, researchers, and development practitioners to work towards sustainable and inclusive agricultural development in India.

Literature Review

Sustainable Agricultural Innovations: Definitions and Realities

Sustainable agricultural innovations are new knowledge, technologies, practices and/or systems that are structured to achieve food security, sustainable natural resource management and socio-economic well-being. These new approaches are intended to satisfy current needs related to food without undermining the ability of future generations to satisfy their needs (FAO, 2017). They include a variety of practices like precision agriculture, organic farming, zero budget natural farming, crop diversification, integrated pest management and smart irrigation.

According to Pretty et al. (2018), note that sustainable technological innovations also have institutional and social dimensions—they result in changes in governance, farmer practices, and market connections. As an instance, Farmer Producer Organisations (FPOs) in India are an institutional innovation that increases bargaining power, market access and dissemination of knowledge for smallholders. Mobile-based platforms, such as e-Choupal and Kisan Suvidha, are digital solutions that address the problem of information asymmetry and empower farmers to make informed decisions.

Crucially, these innovations are virtually always context-dependent. According to Altieri and Nicholls (2020), sustainable practices need to be designed for the local agro-ecological context and be rooted in local knowledge systems for them to be successful and scalable. However, constraints including low levels of awareness, limited technical knowledge, credit problems, and limited willingness to take risks among the resource-poor farmers prevent widespread adoption.

Development for All in Agriculture

It involves all people in society, but especially those who are or have been marginalised, in leading and benefiting from development. It goes beyond economic growth and stresses social justice, participation and empowerment (Ranieri & Ramos, 2013). In the case of agriculture, inclusive growth would mean the upliftment of conditions of small and marginal farmers, women, tribal, and landless labourers.

According to empirical findings, inclusiveness in agriculture depends on land ownership, literacy, social capital and institutional access. Marginal farmers (i.e., with landholding less than 1 ha) comprise more than 65% of India's farming community, but have scarce access to institutional credit, markets and extension services (Dev, 2012). Despite their substantial contribution to agriculture, there is a systemic exclusion of women farmers from land rights and capacity building from decision-making positions (Agarwal, 2014).

In such a situation, promoting inclusive agricultural development would involve the formulation of purposeful programmes such as affirmative actions, women-centric extension, participatory technology generation and decentralisation of agricultural services. Initiatives like Mahila Kisan Sashaktikaran Pariyojana (MKSP) and Self-Help Groups (SHGs) have shown favourable results while imparting paramount importance to social inclusion along with livelihood development.

Confluence: Sustainable Innovations and Inclusive Development

The coupling of sustainable innovators with inclusive development is receiving increasing attention in scholarly and policy debates. As Meinzen-Dick et al. (2019) contend that AG innovations can reinforce or challenge current disparities depending on how they are developed, delivered and adapted. Such innovations generate few claims, but when co-created with community participation and dispersed through inclusive pathways, they can increase the power of the disenfranchised farmers, boost resilience, and improve income equality.

For example, research by Doss & Morris (2001) finds that the diffusion of technology in agriculture has historically benefited better-off farmers because of economies of scale and that smallholders are generally excluded due to high upfront costs and low levels of information. This points to the importance of inclusive innovation, as defined by Heeks et al. (2014) as technology being approachable, affordable, and beneficial to disadvantaged populations.

There are some models of success in India. The case of Zero Budget Natural Farming (ZBNF) programme in Andhra Pradesh, India has demonstrated examples of low-cost sustainable methods that can strengthen soil health and enhance crop productivity and are accessible to smallholders (Khadse et al., 2018). Use of solar-based irrigation pumps in

Bihar has helped decrease the reliance on costly diesel inputs and provided smallholders the ability to grow multiple crops on additional acreage (IRENA, 2020).

However, such models cannot be easily scaled. The problem of the moment is how to build enabling ecosystems (i.e., supportive policies, credit systems, knowledge networks and market structures) that support inclusive innovation. Also, as demonstrated by Hall et al. (2001), agricultural innovation systems in the future must take a whole-system approach, including multi-stakeholder partnerships and feedback loops, including local knowledge and farmer voices.

Gaps in the Literature

There is extensive literature on agricultural sustainability and technological innovation; however, few studies have examined their aggregate effect on inclusivity, and that includes topics like the Indian rural. Much of the academic literature appears to treat sustainability and inclusivity as separate policy goals. In addition, there is scarce micro-level information on what types of innovation, whether technological, institutional, or social, have the most significant effect in increasing indices of development associated with inclusive development, in the form of access, participation and equity. How regional, cultural, and ecological diversity impact what comes out of innovation should also be considered. For instance, successful solutions in irrigated, market-integrated spaces may not be applicable in rainfed, tribal regions. Similarly, analysis of innovation adoption from a gender perspective is relatively underdeveloped and crucial, but often unseen the role women play in farming.

The present study aims to address these gaps by empirically examining the differential effects of sustainable agricultural innovations on inclusive development in various categories of Indian farming communities. It also seeks to describe the innovations that provide dual ecological and governance benefits, barriers to their application among disadvantaged populations, and the adoption of innovations.

Research Methodology

The methodology used is integrated approach to epistemology, drawing on normative and critical theory, to explore the relationship of sustainable agricultural innovations to inclusive development within Indian farming communities. This mixed-methods, method allows for both quantitative and contextual analysis.

Study Area and Sampling

The study was undertaken in three states- Punjab, Maharashtra and Karnataka - to represent diverse agro-climatic and continuing innovation efforts.

Sampling technique:

Multistage stratified random sampling. First, one district in each state was chosen on the basis of innovation activity. More than 18 villages were then selected randomly, two per district. Ten to 15 farmers from each village were interviewed with particular interest in targeting smallholders, women, and marginalised castes. The respondents totalled to 360.

The sample size of 360 farmers was determined based on two considerations: statistical adequacy for quantitative analysis and representation across diverse farming communities. First, for large rural populations, a minimum sample of 300 respondents is recommended to achieve reliable estimates with a 95% confidence level and a margin of error of approximately $\pm 5\%$ (Krejcie & Morgan, 1970). A sample of 360 therefore exceeds this requirement, providing sufficient power for descriptive and inferential statistical analyses, including regression and comparative tests. Second, the sample was proportionately distributed across three states: Punjab, Maharashtra, and Karnataka, to capture geographic, ecological, and socio-economic diversity in innovation adoption. This ensured that the findings reflect broad patterns across different agricultural systems and are not restricted to a single regional context. Thus, the final sample size supports both analytical rigor and representativeness.

Data Collection Methods

The following were the methods of collection of primary data:

- Formatted surveys for measuring adoption of innovations and inclusion indicators;
- Farmer Group FGDs for perception and challenges identification;
- Key informant interviews with agricultural officers and NGOs.
- Field visits to the villages.

- The secondary data was collected from government reports, policy papers, and published reports about sustainable agriculture and rural development.

Variables

- **Independent Variables:** Type of sustainable agricultural innovation (bio-inputs, digital tools, sustainable irrigation systems and community-based models such as SHGs, FPOs).
- **Dependent Variables:** indicators of inclusive development: income equality and participation in local institutions, access to technology, credit and market information.
- **Control variables:** Age, sex, caste, landholding size, and education level.

To minimise internal biases in the qualitative component of the study, several measures were adopted. First, data triangulation was used by collecting qualitative responses through focus group discussions, field observations, and open-ended questions in the survey, thereby cross-validating emerging themes across sources. Second, researcher reflexivity was maintained throughout the fieldwork to avoid personal interpretation influencing responses; reflective notes were recorded after each interaction. Third, qualitative data were coded independently by two researchers to enhance inter-coder reliability, and discrepancies were resolved through consensus discussions. Finally, participants’ statements were captured in their own words to ensure authenticity and reduce the risk of interpretive bias

Data Analysis

The quantitative data were analysed employing descriptive statistics and regression analysis (using SPSS) to measure the influence of innovation on inclusivity outcomes. Qualitative data from FGDs and interviews were thematically coded (with the aid of NVivo) concerning access, community empowerment, and innovation barriers.

Ethical Considerations

Consent: Informed consent was signed by all included subjects. Confidentiality and anonymity were ensured, and the institution’s ethics committee sanctioned ethical clearance. Active participation by all, including women and the marginalised, was promoted.

All tables used in this paper are original and generated using the primary data collected from respondents. Each table is properly titled and includes a source note such as “Primary Data (2025)” to avoid any form of copyright violation.

Limitations

The limitations of this study include the restricted regional focus (to three states), the potential bias in the self-reporting of data, and its essentially cross-sectional design that precludes a comparative perspective through time. That said, the mixed-methods strategy enhances validity and provides insights pertinent to the sustainability-inclusion equation in rural India.

Results and Interpretation

Acceptance of Sustainable Agricultural Innovations

Table 1: Adoption of Innovation by Type and State (% of Respondents)

Innovation Type	Punjab	Maharashtra	Karnataka	Overall
Bio-inputs (e.g., compost)	38%	42%	56%	45%
Drip/Sprinkler Irrigation	41%	49%	12%	32%
Digital Tools (apps, SMS)	52%	23%	11%	26%
FPO/SHG Participation	29%	34%	38%	34%

Source: Primary data collected by the researcher (2025)

Interpretation: The Adoption of innovation is informed by where you live. Community-level promotion has led to the highest organic practices followed in Karnataka. Advanced ICT in Punjab enables heavy adoption of digital tools. These trends indicate that the scaling of innovation needs to be adapted to local context, such as climate, extension networks and policy emphasis.

Income Effect From Innovations up-taking

Table 2: Mean Annual Income according to Farmer Type and Innovation Status (in ₹)

Farmer Type	Non-Adopters	Single Innovation	Multiple Innovations
Smallholders (<2 acres)	₹52,000	₹61,500	₹72,800
Medium Farmers (2–5 ac)	₹88,000	₹97,200	₹1,13,600

Source: Primary data collected by the researcher (2025)

Interpretation: Income increases with the number of innovations adopted, and smallholders benefit relatively more. Income among multi-innovation adopters was 40 per cent higher relative to non-adopters. This confirms the positive contribution of innovation to inclusive rural prosperity, especially for marginal farmers.

Participation and Empowerment through Innovations

Table 3: Participation in Institutions and Decision-Making (%)

Group	FPO/SHG Membership	Local Decision Participation
Non-Adopters	22%	16%
Innovation Adopters	56%	48%
Women Adopters (SHG-linked)	64%	52%

Source: Primary data collected by the researcher (2025)

Interpretation: Adopters of innovation are more institutionally involved. Wage women in equally SHGs are more empowered in terms of control, and more involved in decision-making. These results suggest that innovations, especially those embedded in community norms, might function as vehicles for empowerment more than productivity.

Access to Services and Institutional Support

Table 4: Access to Agricultural Services (% of Respondents)

Service Access	Innovation Adopters	Non-Adopters
Received Training	40%	12%
Accessed Crop Credit	53%	29%
Received Market Info	47%	18%

Source: Primary data collected by the researcher (2025)

Interpretations: Adopters had significantly more access to institutional services--training, credit, and information. Nevertheless, there are gaps, indicating there are non-adopters that are not included in support mechanisms, which could give rise to a vicious spiral of exclusion, if not reached by policy interventions.

Barriers to Innovation Adoption

Table 5: Major Barriers Reported by Social Group (%)

Barrier	Smallholders	Women Farmers	SC/ST Farmers
Lack of Awareness	62%	71%	68%
High Initial Cost	59%	64%	61%
Inadequate Training	46%	58%	55%
Insecure Land Tenure	14%	49%	51%

Source: Primary data collected by the researcher (2025)

Interpretation: Barriers are higher for women and SC/ST farmers. A lack of awareness and limited land ownership significantly impede innovation. This highlights the importance of specific inclusion measures such as land rights reforms, women-centric models and personalised finance mechanisms.

Regional Differences in Innovation Ecosystem

Table 6: Regional Performance Summary

State	Strengths	Weaknesses
Punjab	Digital tools, ICT penetration	Low bio-input use, poor women's engagement
Maharashtra	Irrigation innovation, microcredit	Weak FPO coverage in tribal regions
Karnataka	SHG/FPO presence, bio-farming	Limited irrigation, tribal accessibility

Source: Primary data collected by the researcher (2025)

Interpretation: The effectiveness of innovation is strongly dependent on regional enablers. Digital Punjab is great, but not inclusive; Karnataka is great at grassroots models, but does not have the infrastructure. That means policy design must be state-specific, and support local institutions, infrastructure and marginalised groups in unique ways.”

Summary Interpretation

Novelties, income access, and attendance have a positive correlation.

- Inclusive potential is, however, hampered by gender, smallholder, and tribal farm and farmer access inequities.
- Community-based models (SHGs/FPOs) and multi-innovation uptake are the most significant drivers of inclusiveness.
- State context matters for innovation success, and there is a need for decentralised, tailored policy interventions.

Conclusions and Policy Implications

This paper analyses how sustainable agricultural innovations influence inclusive development in Indian farming communities located in Punjab, Maharashtra and Karnataka. Using survey data (n = 360), regression analysis, and focus group discussions (qualitative and quantitative mixed-methods), we discovered that:

Income equality is promoted through multi-innovation assimilation. Farmers using more than one innovation (bio-inputs, irrigation systems, digital tools, and institutional models) earned 20–30% more per annum, with smallholders benefitting most, proportionally.

Community-based models promote social inclusion. Among the most influential variables, membership in the FPOs and SHGs had a significant influence on participation in local governance and collective decision-making in favour of women from the depressed caste.

Digital tools widen access, albeit unevenly. The advent of mobile advisory platforms made market prices, weather forecasts and access to credit more accessible; however, literacy and connections played a strong role in benefit accrual.

For the most vulnerable, barriers endure. Awareness, initial costs, training availability, and tenure insecurity most affected the adoption rates of innovation among women, women from SC/ST households, and small farmers.

While interpreting the qualitative findings, efforts were made to minimise analytical and interpretive bias. Themes were finalised only when they consistently appeared across diverse respondent groups and regions, preventing over-generalisation from isolated statements. The qualitative insights were further compared with quantitative trends to ensure balanced interpretation, so that conclusions were not shaped solely by subjective narratives. The original transcripts and field notes were revisited during analysis to confirm that interpretations accurately reflected farmers' lived experiences rather than researcher assumptions. This systematic approach strengthened the credibility and trustworthiness of the qualitative conclusions of the study.

These results highlight that sustainable innovations are essential but not enough for inclusive rural transformation. To turn innovation into equity, focused policy and programmatic interventions are needed.

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Policy Implications

Finance and De-risk Uptake of Innovation

Targeted Financial Incentives: Expand targeted subsidy programmes (e.g., subsidised-interest micro-loans; grants) for smallholders and women-led SHGs to invest in irrigation and digital technologies.

Insurance and Credit Guarantees: Create crops and technology insurance schemes that reduce perceived risk and encourage first-time adoption.

Build Institutions That Are Community-Driven

Scale FPO/SHG Networks: Institutionalise and finance state-level federations of FPOs/SHGs to strengthen bargaining strength, collective marketing and joint learning.

Capacity: Deliver continuous, practical training through field schools and farmer-to-farmer extension to build more local ownership and knowledge sharing.

Strengthen Digital and Extension Infrastructure

Decentralised ICT Solutions: Investing in adequate regional, low-bandwidth advisory infrastructures that address the needs of the tribal and low-literacy populace.

Mobile Extension Units: Digital Krishi Mitra teams to be promoted with Tablets and demonstration kits for making digital interventions to bridge the digital gap in remote and hilly areas.

Nurture Ecosystems of Inclusion and Innovation

Multi-Stakeholder Partnerships: Promote partnerships between the public sector, NGOs, academia and private companies in order to co-develop innovations with end users.

Policy Coherence: Operationalise innovation, inclusion and sustainability through state agricultural policies and their alignment with schemes like PMKUSUM (solar pumps), PMKSY (irrigation), and National Mission for Sustainable Agriculture.

Tackle Land and Gender Barriers

Land-Tenure Security: Speed up the process of land-record digitalisation and provision of joint land titles for women to enhance their confidence and collateral eligibility.

Women's Leadership Programs: Support women extension agents and leadership training to change gender norms and extend outreach.

Future Work Directions

Longitudinal Implementation Evaluation: Follow cohorts across multiple seasons and capture changing effects of innovation on resilience, livelihood diversification and social mobility.

Comparative Studies: Expand the research to rain-fed and semi-arid areas for testing whether the findings are robust across agro-ecological gradients.

Granular Gender Analysis: Disaggregate data of household-level decision-making and resource control to reveal nuanced gendered results.

Policy experiments: Pilot randomised subsidy or training interventions to evaluate cause-and-effect and cost-effectiveness.

In the context of strong institutional support and targeted equity interventions, India can therefore drive a dual agenda of sustainability and inclusion, ensuring that agricultural innovation uplifts every farmer, regardless of their social position, and casts aside traditional gender roles.

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Appendix: Questionnaire

Title: “The Contribution of Sustainable Agricultural Innovations to Inclusive Development: An Examination of Indian Farming Communities”

It includes sections for collecting quantitative and qualitative primary data and is suitable for mixed-method research. Each section includes Likert-scale, multiple-choice, and open-ended items, enabling both statistical and thematic analysis.

Purpose: This survey aims to understand how different agricultural innovations affect farmers' income, access, and inclusion.

Voluntary Participation & Confidentiality: Your participation is voluntary. You may skip any question or stop at any time. Your responses will remain anonymous and will be used only for academic research.

Consent (Please tick):

[] I understand the purpose of this study.

[] I agree to participate voluntarily.

[] I know my responses will remain confidential.

Date: _____

Section A: Demographic Details

1. **Name (Optional):** _____

2. **Age:**

Below 25 25–40 41–60 Above 60

3. **Gender:**

Male Female Other

4. **Education Level:**

No formal education Primary Secondary Graduate & above

5. **State:**

Punjab Maharashtra Karnataka Other: _____

6. **Caste Category:**

General OBC SC ST

7. **Landholding Size:**

Less than 1 acre 1–2 acres 2–5 acres More than 5 acres

8. **Main Source of Income:**

Farming Wage labor Business Others (specify): _____

Section B: Agricultural Innovation Adoption

9. Which of the following innovations have you adopted? (Tick all that apply.)

Organic/Bio-inputs (e.g., compost, biofertilizer)

Drip/Sprinkler Irrigation

Mobile apps/SMS for weather or price info

Membership in FPO/SHG

Soil testing services

None of the above

10. What year did you start adopting these innovations? _____

11. What motivated you to adopt them? (Tick all that apply.)

Government schemes NGO support Peer influence Own interest

Section C: Access to Services (Rate on 5-point Likert Scale)

1 = Strongly Disagree, 5 = Strongly Agree

Statement	1	2	3	4	5
I received training before using the innovation.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I have access to timely market price information.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Government officials/agri-officers regularly support me.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Access to credit has improved after innovation adoption.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I feel supported by my FPO/SHG.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Section D: Impact on Income and Well-being

12. Your average annual income from farming:

- Below ₹50,000 ₹50,001–₹1,00,000 ₹1,00,001–₹2,00,000 Above ₹2,00,000

13. Compared to before innovation adoption, your income has:

- Decreased No change Slightly increased Significantly increased

14. Please rate the following (1 = Very Low, 5 = Very High):

Impact Area	1	2	3	4	5
Improvement in crop yield	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Market access	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Household food security	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Financial stability	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Section E: Participation and Inclusion

15. Are you a member of any of the following?

- Self Help Group (SHG) Farmer Producer Organization (FPO) Neither

16. Do you participate in the following?

- Decision-making in village-level farming activities: Yes No
- Group marketing or collective selling: Yes No

17. As a woman/SC/ST farmer, do you feel represented in farming decisions?

- Not at all Rarely Sometimes Mostly Fully

Section F: Barriers to Innovation Adoption

18. What are the main barriers you face? (Tick all that apply.)

- Lack of awareness
- High initial investment
- Lack of training
- Poor access to markets
- No land ownership
- Social discrimination

19. Suggestions for improving adoption among small/marginal farmers:

Section G: Additional Feedback (Optional)

20. How can the government or NGOs better support innovation in farming?

Thank you for your valuable response.

