

From Agents to Algorithms

A four-pillar assessment of the journey to AI-based advisory for climate-resilient smallholder agriculture

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Fifty years of evolution of agricultural advisory shows a recurring pattern: extension technologies solve one bottleneck while creating another. Artificial Intelligence (AI) brings scale and responsiveness. What it does not automatically bring is local knowledge of markets, availability of technologies and inputs and production constraints, or equitable access.

Platform scouting (68 AI advisory tools screened, 10 assessed in depth), a 2022 survey of 2,068 paired men and women in Bihar and Odisha, and expert interviews, were done and compared against national data on conventional and digital extension. Dimensions used:

Effectiveness | Inclusivity | Trust & Feedback | Agency & Data Sovereignty

1 Effectiveness

AI wins on speed and cost. Accuracy and reach depend on design.

	Conventional	Digital	AI-based
Speed	Weeks. One or two visits a season.	Fast, but one-way.	Seconds, with follow-up.
Cost*	≈ US\$30 per farmer	≈ US\$3 per farmer	≈ US\$0.30 per farmer
Accuracy	Local, but dated.	Generic content.	Personalised; site accuracy weak. 1 of 9 apps shows sources.
Reach	Under 10% of farm households.	Only the connected.	Filtered by device, skill, language: 71% score low on digital literacy.

Accuracy needs local knowledge the internet does not hold: stocked pesticides, machinery, varieties, prices, sowing windows. Build a verified local knowledge base and refresh it every season.

* Cost figures are indicative, order of magnitude.

2 Inclusivity

Each wave changed who is rationed out, not the fact of rationing.

	Conventional	Digital	AI-based
Left out	Farmers the agent never visits: poorer, women, less connected.	Those without a phone or a signal.	Those without a smartphone, the skills, or the language.

Access is nearly level. Capability is not.

Own a smartphone

High digital literacy

Group	Own a smartphone (%)	High digital literacy (%)
Men, Gen/OBC	59	39
Women, Gen/OBC	45	9
Men, SC/ST	53	27
Women, SC/ST	42	2

99% never trained

78% want to learn

The gender gap in skills is two to three times the gap in phones. It holds at every age and in every caste group. Invest in skills, not devices.

Source: CGIAR Digital Needs Assessment Survey 2022, Bihar and Odisha, 2,068 paired respondents.

3 Trust & feedback

Error scales as fast as good advice. Farmers cannot tell them apart.

	Conventional	Digital	AI-based
Trust in	A known person, who answers for the advice.	The sender's brand.	A fluent answer. No adviser, no source, no one liable.

Logged in seconds, evaluated never

Research

knowledge

AI

Farmer

impact: unknown

every query logged

Logs show what farmers ask, not whether the advice worked. No AI advisory has an independent impact evaluation.

1 of 9 platforms shows its sources

6 of 9 tie advice to sales

Advice is a credence good: farmers cannot judge it before acting, or after. Show sources, state uncertainty, and route high-risk advice to a human.

Source: audit of nine AI advisory platforms in India (Krishna & Puliyancheri, 2026).

4 Agency & data sovereignty

Free advice is not neutral. Who pays for it shapes it.

	Conventional	Digital	AI-based
Paid by	The state. Data on paper, little reused.	Donors or subscriptions. Data stays with the platform.	Free to the farmer. Revenue from sales tied to the advice.

Who runs India's nine AI advisory platforms?

6 Private

1 Non-profit

2 Government

0 of 9 charge for advice

Unclear who is liable for wrong advice

The open questions are institutional: who finances advice, who verifies it, who bears the cost of a wrong call. Public infrastructure should hold the validated knowledge and open it to all.

Source: audit of nine AI advisory platforms in India (Krishna & Puliyancheri, 2026).

Generate a local knowledge base, and design for hybrid extension, not human-free extension

AI has sharply reduced the marginal cost of advice. The harder challenge is designing systems that are accurate, inclusive, trusted and accountable.

1 Generate the local knowledge base

The internet does not know which pesticides the local dealer stocks, which machines are for hire, or local prices. AI advisory needs a verified local knowledge base with continuous updating.

2 Voice first, skills in the village

Local-language voice interfaces, and women-targeted skills training in the village. Invest in capability, not devices.

3 Keep trusted humans in the loop

Route AI through the person the farmer already talks to: KVK staff, Krishi Sakhis, village women entrepreneurs.

4 Make AI accountable

Show sources. Return farmers' questions to research. Report reach among women and marginalised castes.



Relevant literature

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