# Financial and trust hurdles slow AI adoption on small- and medium-sized farms



The integration of artificial intelligence (AI) into agriculture has the potential to revolutionise farming practices, making operations more efficient and sustainable. However, this technological advancement does not come without considerable challenges, particularly for small- and medium-sized farms. As farmers grapple with the complexities of AI systems, issues such as high costs, trust in technology, and data privacy concerns become paramount.

One of the most pressing barriers to AI adoption in agriculture is the substantial financial investment required. The costs of purchasing, implementing, and maintaining these technologies can be prohibitive for many farmers. Speaking to industry experts, it has been noted that “one major obstacle is the high cost of purchasing and implementing these systems, which may be prohibitive for small- and medium-sized farms,” as highlighted by Dr. Dara in a recent discussion. This financial strain is compounded by the need for ongoing training to ensure that workers can effectively utilise these new tools. As such, many farmers remain hesitant to fully adopt AI solutions until they are convinced of their efficacy in specific agricultural contexts.

Moreover, the reliability and accuracy of AI technologies can vary greatly, which further fuels scepticism among farmers. In rural areas, limited access to reliable high-speed internet hampers the usability of AI and Big Data, making it difficult for farmers to take full advantage of these innovations. An analysis indicates that “governments and agricultural organisations should provide financial assistance and subsidies to farmers to help them invest in these technologies,” highlighting a potential pathway to foster greater adoption. However, the challenge remains that while many AI models show promise, they still struggle to adapt to real-world variables like changing climate patterns and supply chain disruptions.

Trust in AI systems is another critical concern. Farmers are often reluctant to rely on technology that lacks transparency and explanation regarding its decision-making processes. An article discussing the ethical dimensions of AI in agriculture notes that “data derived from AI may improve transparency and promote trust,” but many stakeholders remain wary, fearing for the security and ownership of their data. With increasing instances of cyberattacks, the need to safeguard sensitive farm information is becoming more pronounced.

In this context, there is a notable push for open communication and transparency regarding how AI systems function. Experts argue that fostering understanding and trust is essential for widespread adoption. By addressing the apprehensions surrounding data privacy and enhancing security measures, the agricultural sector could harness AI to create a more equitable and resilient food system.

As various regions, particularly in developing countries like India, begin to see the benefits of AI tools in agriculture—such as advanced weather forecasting that aids smallholder farmers in making informed planting decisions—there is a recognition that the gap between technological advancement and its accessibility for all farmers needs to be bridged. Initiatives aimed at extending these technologies to underserved communities are crucial, as they could significantly bolster global food security.

In conclusion, while AI holds great promise for enhancing agricultural productivity and sustainability, addressing the multifaceted challenges of cost, trust, and data privacy is essential to facilitate its acceptance and integration. Continued dialogue among stakeholders, combined with supportive policies, can pave the way for a technological evolution that benefits all sectors of the agricultural community.

### 📌 Reference Map:

* Paragraph 1 – [[1]](https://m.farms.com/ag-industry-news/artificial-intelligence-aiding-operations-but-not-without-concerns-034.aspx), [[3]](https://thefarminginsider.com/ai-and-big-data-farming/)
* Paragraph 2 – [[1]](https://m.farms.com/ag-industry-news/artificial-intelligence-aiding-operations-but-not-without-concerns-034.aspx), [[4]](https://www.argonandco.com/en/news-insights/articles/ai-in-agriculture-overcoming-barriers-and-reaping-the-benefits/), [[6]](https://www.sciencesocieties.org/publications/crops-soils/2024/september-october/building-trust-in-ai-farming-tools)
* Paragraph 3 – [[5]](https://link.springer.com/article/10.1007/s00146-021-01377-9), [[4]](https://www.argonandco.com/en/news-insights/articles/ai-in-agriculture-overcoming-barriers-and-reaping-the-benefits/)
* Paragraph 4 – [[2]](https://www.reuters.com/sustainability/land-use-biodiversity/comment-how-empowering-smallholder-farmers-with-ai-tools-can-bolster-global-food-2025-01-10/), [[6]](https://www.sciencesocieties.org/publications/crops-soils/2024/september-october/building-trust-in-ai-farming-tools)
* Paragraph 5 – [[7]](https://technologyfactors.com/disadvantages-of-ai-in-agriculture/)
* Paragraph 6 – [[1]](https://m.farms.com/ag-industry-news/artificial-intelligence-aiding-operations-but-not-without-concerns-034.aspx), [[2]](https://www.reuters.com/sustainability/land-use-biodiversity/comment-how-empowering-smallholder-farmers-with-ai-tools-can-bolster-global-food-2025-01-10/)

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## Bibliography

1. <https://m.farms.com/ag-industry-news/artificial-intelligence-aiding-operations-but-not-without-concerns-034.aspx> - Please view link - unable to able to access data
2. <https://www.reuters.com/sustainability/land-use-biodiversity/comment-how-empowering-smallholder-farmers-with-ai-tools-can-bolster-global-food-2025-01-10/> - This article discusses how AI-powered tools, such as advanced weather forecasting, are helping smallholder farmers in rural India make smarter planting decisions, leading to reduced debts and increased savings. The success in India has prompted initiatives to extend similar technology to farmers across Asia, Africa, and Latin America, potentially transforming global agriculture. Despite the existence of efficient agricultural solutions, many smallholders lack access due to inadequate resources. The article emphasizes the need for increased global climate finance to bridge this gap and enhance food security worldwide.
3. <https://thefarminginsider.com/ai-and-big-data-farming/> - This article explores the barriers and challenges in adopting AI and Big Data in farming, focusing on cost and accessibility of technology. It highlights that the upfront costs of purchasing advanced technology can be prohibitive for many farmers, and in some rural areas, there may be limited access to reliable high-speed internet, which is crucial for utilizing AI and Big Data effectively. The article suggests that governments and agricultural organizations should provide financial assistance and subsidies to farmers to help them invest in these technologies.
4. <https://www.argonandco.com/en/news-insights/articles/ai-in-agriculture-overcoming-barriers-and-reaping-the-benefits/> - This article discusses the challenges of AI adoption in agriculture, particularly for smallholder farmers. It highlights issues such as trust and explainability of AI models, cost and return on investment concerns, AI struggling with real-world variability, and infrastructure barriers like lack of broadband connectivity. The article suggests that farmers tend to stick with proven methods because AI models still struggle to adapt to shifting climate patterns, variable crop conditions, and changing supply chain disruptions.
5. <https://link.springer.com/article/10.1007/s00146-021-01377-9> - This article examines the social and ethical impacts of artificial intelligence in agriculture, focusing on trust, beneficence, and freedom and autonomy. It discusses how data derived from AI may improve transparency and promote trust, but it is also difficult for humans to trust AI because it lacks emotive states. The article also highlights concerns about data security, privacy, and ownership, and how unclear regulations and guidelines related to AI have made agricultural stakeholders hesitant to accept AI technologies.
6. <https://www.sciencesocieties.org/publications/crops-soils/2024/september-october/building-trust-in-ai-farming-tools> - This article discusses the concerns that might prevent farmers from adopting machine learning-based decision support systems (DSS), including cost, knowledge, security, and confidence. It highlights that sticker shock is a main deterrent, especially for small farms where the cost per hectare is larger and a return on investment takes longer to reach. The article also discusses concerns about data security, privacy, and ownership, and how farmers are concerned that their data will not just be their data and they don’t know what the companies will do with that data.
7. <https://technologyfactors.com/disadvantages-of-ai-in-agriculture/> - This article discusses the disadvantages of AI in agriculture, focusing on high costs and the need for advanced technical skills. It highlights that AI in agriculture can be very expensive, with high initial investment costs for equipment and maintenance expenses. The article also discusses concerns about job displacement as machines replace manual labor and data privacy concerns arising with the extensive use of sensors and data collection. It emphasizes the need to balance these disadvantages for sustainable agricultural progress.