

Primary Reasons in Developing Countries that Prevent Small Farms from Adopting AI.

Md Aminur Rahman*

Department of G2 big data management, Gangseo University, Seoul, South Korea

***Corresponding author:** Md Aminur Rahman, Department of G2 big data management, Gangseo University, Seoul, South Korea

Received:  March 03, 2025

Published:  March 07, 2025

Abstract

The revolution of artificial intelligence is blessing mankind by increasing productivity in different sectors. The agricultural sector is also benefiting from the utilization of AI. The study looked at the literature and found that small farms in developing countries might not be able to use AI in their farming even if they can afford it and the infrastructure for it is in place. The limitation is due to a lack of digital skills and knowledge among farmers. This research highlights the significance of training in digital skill development and the promotion of essential information; hence, it recommends policy implications.

Introduction

Small farms are the primary source of food production in developing countries [1], and more than one-third of the world's food is produced by the small farming system [2]. Given their significant contribution to global food production, it is crucial to prioritize small farms and enhance their productivity.

The importance of the application of AI in agriculture is so great that the welfare of AI will be denied if it fails to show its potential in agriculture, which is one of four major sectors where AI is supposed to contribute [3]. Developing countries are fully utilizing AI in agriculture. Farms in developing countries are also taking advantage of AI. However, only large farms in developing countries are observing the visible application of AI [4].

Due to the widespread adoption of AI in different sectors, AI is becoming affordable, and several governments in many developing nations are ready to provide infrastructural support since it is well established that the implementation of AI increases productivity. Based on the aforementioned reasons, the current study assumes small farms are financially capable and have enough infrastructure

supports to implement AI. It is understandable that small farms in developing countries often face challenges due to limited access to finance and inadequate infrastructure, which hinders their ability to utilize modern technologies. National and international NGOs and the government itself in many countries (i.e., Bangladesh) are providing privileges to the small and medium farms. That is why the current study assumes that the commonly known barriers will be removed in the near future and discusses future challenges, apart from funding and infrastructure.

AI in agriculture:

In the age of the artificial intelligence (AI) revolution, all the industries and economic sectors, including the agriculture sector, are being benefited by the application of AI. Artificial intelligence nowadays can benefit every aspect of agriculture, from planning to marketing.

Modern agricultural practices demonstrate that AI is being implemented in many steps of the production process, including crop surveillance, irrigation management, fertilizer application,

yield forecasting, supply chain optimization, and plant control. AI may assist in avoiding the trial-and-error method by finding ideal agricultural land, early illness diagnosis, and optimum input recommendations [5-10] have already established the relationship between AI and ICT use in agriculture studies by studying 56 selected papers.

AI has already proven its efficiency in agricultural practices; the question remains to what extent developing countries are utilizing these opportunities. The answer to the question was retrieved from the work of Pro [11,12]. AI-related initiatives in some developing nations are inconspicuous or even non-existent. While this may come as a shock, [13] elucidates the promising opportunities of AI in developing countries [10]. studied the role of AI in agriculture and established that it can mitigate all the challenges faced by farmers in developing nations.

The primary obstacle to incorporating AI into agricultural practices in developing countries stems from the predominantly marginal farmers and labor-intensive nature of production. In a recent study to discover the challenges to adopting AI in developing countries, [14] identified that the financial constraints, infrastructural limitations, lack of skilled manpower, data unavailability, customization, regulatory frameworks, cultural barriers, limited market access, and lack of collaboration, along with other reasons, are responsible for the repudiation of AI in developing countries. To resolve the problem, the authors suggested multiple actions, and most of the actions require government interference. Although, in this age of globalization, private sector players can contribute to the fostering of the implementation of AI, government intervention can accelerate the adoption of AI in developing nations.

Major Barriers faced by small farms:

Lack of digital skills

Farmers, particularly those who live in rural areas and operate a small farm, are usually run by a single person, and typically illiterate people are involved in such kinds of farms. Even if they have primary education, it is not enough to handle AI equipment since agriculture cannot wholly rely on AI because it cannot work outside its programming [15] and periodic command is required to get the AI in use. Due to the lack of digital skills, it becomes impossible for small farms to get an advantage from AI.

Lack of information

Farmers in developing countries are familiar with traditional cultivation systems, and many of them are reluctant to try modern farming techniques. The reason for not adopting new techniques could be their uninterestingness or unavailability of agricultural information [16], which causes a challenge in the application of AI in agriculture. To provide information, a simple mobile phone can be useful [17]. However, in some developing countries, access to mobile phones is not yet ubiquitous [18].

Conclusions

The use of artificial intelligence is growing globally and is being employed across all sectors. In agriculture, AI is contributing to increasing productivity by minimizing trial and error time and cost. However, the use of AI in developing countries is limited and more limited to those who own a small firm. The affordability of AI and the inadequate infrastructure in developing countries are principal concerns. The rapid pace of the AI revolution indicates that we will overcome these concerns. If we solve the affordability and infrastructure problems, will small farms in developing countries utilize AI, or will they still face more barriers? This short review article aimed to answer that question. After reviewing several articles related to AI and agriculture, it was found that in the absence of digital skills and information, small farms in developing countries will be unable to utilize AI in their farming practices. The current study recommends, based on the findings, that as a part of infrastructure development, the government should provide training on digital skill development, and necessary information related to the use of AI in agriculture should be published through media and agricultural extension channels.

References

1. Ricciardi V, Ramankutty N, Mehrabi Z, Jarvis L, Chookolingo B (2018) How much of the world's food do smallholders produce?. *Global food security* 17: 64-72.
2. Lowder S K, Sánchez M V, Bertini R (2021) Which farms feed the world and has farmland become more concentrated?. *World Development* 142(2): 105455.
3. Mvurya M (2020) The extent and use of artificial intelligence to achieve the big four agenda in Kenya. *Multidisciplinary Journal of Technical University of Mombasa* 1(1): 1-7.
4. Elbasi E, Mostafa N, Al Arnaout Z, Zreikat A I, Cina E, et al. (2022) Artificial intelligence technology in the agricultural sector: A systematic literature review. *IEEE access* 11: 171-202.
5. Dharmaraj V and Vijayanand C (2018) Artificial intelligence (AI) in agriculture. *Int. J. Curr. Microbiol. App. Sci.* 7(12): 2122-2128.
6. Eli Chukwu N C (2019) Applications of artificial intelligence in agriculture: a review. *Eng. Technol. Appl. Sci. Res* 9(4): 4377-4383.
7. Lioutas E D, Charatsari C, De Rosa M (2021) Digitalization of agriculture: A way to solve the food problem or a trolley dilemma?. *Technology in Society* 67: 101744.
8. Shen Z, Wang S, Boussemart J P, Hao Y (2022) Digital transition and green growth in Chinese agriculture. *Technological Forecasting and Social Change* 181: 121742.
9. Sharma S, Verma K, Hardaha P (2023) Implementation of artificial intelligence in agriculture. *J. Comput. Cogn. Eng.* 2(2):155-162.
10. Songol M, Awuor F, Maake B (2021) Adoption of artificial intelligence in agriculture in the developing nations: a review. *Journal of Language, Technology & Entrepreneurship in Africa* 12(2): 208-229.
11. Pro T (2018) The regional gap in AI adoption. Available at: <https://www.techradar.com/news/the-regional-gap-in-ai-adoption>.
12. Loucks J, Hupfer S, Jarvis D, Murphy T (2019) Future in the balance? How countries are pursuing an AI advantage pp.1-5.

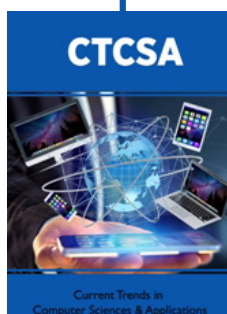
13. Lohr S (2018) From Agriculture to Art—The AI Wave Sweeps In. New York Times, 19, 7.
14. Ahmad A, Liew A X, Venturini F, Kalogeras A, Candiani A, et al. (2024) AI can empower agriculture for global food security: challenges and prospects in developing nations. *Frontiers in artificial intelligence* 7: 1328530.
15. Javaid M, Haleem A, Khan I H, Suman R (2023) Understanding the potential applications of Artificial Intelligence in Agriculture Sector. *Advanced Agrochem* 2(1): 15-30.
16. Chisita C T (2010) An investigation into the use of ICT in the provision of agricultural information to small scale farmers in Harare. In *World Library and Information Congress: 76th IFLA General Conference and Assembly* (pp. 10-15).
17. Mavhunduse F and Holmner M (2019) Utilisation of Mobile Phones in Accessing Agricultural Information by Smallholder Farmers in Dzindi Irrigation Scheme in South Africa. *African Journal of Library, Archives & Information Science* 29(1): 93-101.
18. Misaki E, Apiola M, Gaiani S, Tedre M (2018) Challenges facing sub-Saharan small-scale farmers in accessing farming information through mobile phones: A systematic literature review. *The Electronic Journal of Information Systems in Developing Countries* 84(4): e12034.



This work is licensed under Creative Commons Attribution 4.0 License

To Submit Your Article Click Here: [Submit Article](#)

DOI: [10.32474/CTCSA.2025.03.000167](https://doi.org/10.32474/CTCSA.2025.03.000167)



Current Trends in Computer Sciences & Applications

Assets of Publishing with us

- Global archiving of articles
- Immediate, unrestricted online access
- Rigorous Peer Review Process
- Authors Retain Copyrights
- Unique DOI for all articles