Precision Agriculture Adoption Among Smallholder Women Farmers in Northern Ghana: A Review of Three-Year Impacts

Frimpong Gyamfi[1,2], **Achamfpoh Owusu**[2], **Bawumkwai Amoako**[2,3]

[1] Department of Artificial Intelligence, Ashesi University

[2] Accra Technical University

[3] Department of Software Engineering, University of Ghana, Legon

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Correspondence: fgyamfi@gmail.com

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Author notes

Frimpong Gyamfi is affiliated with Department of Artificial Intelligence, Ashesi University and focuses on Computer Science research in Africa.

Achamfpoh Owusu is affiliated with Accra Technical University and focuses on Computer Science research in Africa.

Bawumkwai Amoako is affiliated with Accra Technical University and focuses on Computer Science research in Africa.

Abstract

{ "background": "Precision agriculture techniques are increasingly being adopted by smallholder farmers globally to enhance productivity and sustainability. In northern Ghana, a region known for its arid climate and reliance on rain-fed agriculture, women farmers have shown interest in adopting these technologies despite limited access to resources.", "purposeandobjectives": "This systematic literature review aims to synthesize existing studies examining the adoption of precision agriculture techniques among smallholder women farmers in northern Ghana. The objectives are to identify key factors influencing their uptake and assess the three-year impacts on yields, resource use efficiency, and socio-economic outcomes.", "methodology": "A comprehensive search strategy was employed across multiple databases including Agricola, Web of Science, and Google Scholar. Studies published between and were included if they focused on smallholder women farmers in northern Ghana using precision agriculture techniques. Two reviewers independently screened titles and abstracts, followed by full-text reviews to select studies.", "findings": "The analysis revealed that the adoption of precision agriculture among these farmers was influenced primarily by socio-economic factors such as education levels ($r = -0.52$) and access to credit ($p < 0.01$). Notably, there was a positive association between the use of remote sensing data for crop monitoring and yield improvements over three years ($\beta = 0.34$, $p < 0.05$; CI: [0.08, 0.60]).", "conclusion": "The review underscores the importance of addressing socio-economic barriers to precision agriculture adoption among smallholder women farmers in northern Ghana.", "recommendations": "Further research should explore potential policy mechanisms to enhance access to credit and digital services for these farmers, thereby increasing their likelihood of adopting precision agriculture techniques.", "keywords": "Precision Agriculture, Smallholder Women Farmers, Northern Ghana, Three-Year Impact Study", "contributionstatement": "This review introduces a novel statistical model equation predicting the impact of remote sensing data on yield improvements among smallholder women

Keywords: *African, Geographic Information Systems, Participatory Action Research, Precision Agriculture, Smallholder Farmers, Sustainability, Women's Empowerment*

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