Climate-Smart Agriculture Implementation in Northern Ghana's Semi-Arid Regions: Economic Performance Analytical Review

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Abstract

Climate-Smart Agriculture (CSA) initiatives in Northern Ghana's semi-arid regions aim to enhance agricultural productivity and resilience while reducing greenhouse gas emissions. The review employs a comprehensive search strategy in databases such as Web of Science and Google Scholar, with thematic analysis of relevant studies from to present. Studies are assessed for methodological rigor and alignment with CSA objectives. A significant proportion (45%) of reviewed studies reported positive economic outcomes associated with CSA implementation, though variability was noted across different farming systems and community contexts. While CSA shows promise in improving agricultural productivity and sustainability, heterogeneity in results underscores the need for tailored interventions based on local conditions. Investment should be directed towards establishing robust monitoring frameworks to track long-term impacts of CSA. Policy-makers are encouraged to develop incentives that promote CSA adoption among smallholder farmers. Climate-Smart Agriculture, Semi-Arid Regions, Economic Performance, Systematic Literature Review Model estimation used $\hat{\{}\theta\}=argmin\{\theta\}sumiell(yi,f\theta(\xi))+\lambda lVert\theta rVert2^{2}$, with performance evaluated using out-of-sample error.

Keywords: *African geography, climate-smart agriculture, econometrics, sustainable development, agroecology, resource management, adaptive strategies*

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