Designing Economically Viable Irrigation Systems for Drought Prone Regions in Mali Using Low-Cost Technologies

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Abstract

Irrigation is critical for sustainable agriculture in Mali, especially in drought-prone regions where water availability significantly impacts crop yields and farmer livelihoods. Agricultural field surveys were conducted to collect data on soil characteristics, water availability, and climatic conditions. A mixed-method approach combining statistical analysis with expert consultations was employed to select appropriate low-cost irrigation technologies suitable for different regions of Mali. Low-cost drip irrigation systems showed a significant improvement in crop productivity by up to 30% compared to traditional flood irrigation methods under drought-prone conditions, with an average annual return on investment exceeding 150 *per hectare . This study demonstrates that low − cost ∧ sustainable irrigation technologies can be effectively in* Y{it}=\beta0+\beta1X{it}+ui+\varepsilon{it}$, with robustness checked using heteroskedasticity-consistent errors.

Keywords: *Sub-Saharan, Africa, Hydrology, Sustainable, Agricultural_Engineering, Micropumping, Water_Share Systems*

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