Designing Economically Viable Irrigation Systems in Drought-Prone Mali Areas

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Abstract

Irrigation systems are essential for sustainable agricultural productivity in drought-prone regions of Mali. However, traditional irrigation methods often prove economically unviable due to high initial costs and maintenance requirements. A mixed-method approach combining quantitative analysis of climate data with qualitative interviews of local farmers was employed. The methodology involved creating a prototype system and conducting cost-benefit analyses to determine its economic viability. The prototype irrigation system demonstrated an average reduction in water usage by 30% compared to traditional methods, primarily due to the efficient design features implemented. This study highlights the potential for low-cost, sustainable irrigation solutions that can be scaled across Mali's rural landscapes, contributing to food security and economic resilience. Local government agencies should prioritise the implementation of these low-cost irrigation systems in drought-prone areas. Further research is needed to validate the findings on a larger scale. Irrigation design, cost-benefit analysis, sustainable agriculture, Mali, rural development The maintenance outcome was modelled as $Y\{\} = beta0 + beta1\,X\{\} + ui + varepsilon\{\}$, with robustness checked using heteroskedasticity-consistent errors.

Keywords: *Geographical Information Systems, Geographic Information Systems, Remote Sensing, Precision Agriculture, Sustainable Development, Cost-Benefit Analysis, Participatory Rural Appraisal*

ABSTRACT-ONLY PUBLICATION

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