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Designing Economically Viable Irrigation Systems for Drought-Prone Mali Terrains

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Abstract

Irrigation systems in Mali are essential for sustainable agriculture in drought-prone regions, but traditional high-cost solutions often discourage investment. A mixed-method approach combining qualitative interviews with quantitative analysis was employed, focusing on existing irrigation infrastructure and farmer needs in the region. Low-cost drip irrigation systems showed an average increase of 20% in crop yield compared to traditional methods, with a standard deviation of ±5%. The study recommends the adoption of low-cost drip irrigation as a viable solution for enhancing agricultural productivity and resilience in Mali's drought-prone areas. Farmers should be provided with subsidies or loans to finance the installation of drip irrigation systems, alongside training programmes on maintenance and operation. The maintenance outcome was modelled as $Y\{\} = beta\,0 + beta\,1\,X\{\} + ui + varepsilon\{\}$, with robustness checked using heteroskedasticity-consistent errors.

Keywords: *Geographic Terms: Malian*

Methodological: Mixed-methods

Theoretical: Sustainable development

Practical:

Low-cost *engineering* *solutions*

Operational:
Infrastructure *resilience*

Strategic:
Resource allocation

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