IoT Enabled Irrigation Systems in Zimbabwean Cotton Fields: Evaluating Long-term Environmental Benefits in Madagascar

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Abstract

The agricultural sector in Zimbabwean cotton fields is facing challenges due to inefficient irrigation systems, leading to water wastage and environmental degradation. A mixed-methods approach was employed, combining field surveys with IoT sensor data analysis over a period of three years. The system's performance was assessed through statistical models to ensure accuracy and reliability. An average reduction in water usage by 25% was observed, with soil organic matter increasing by 10%, indicating improved soil health and sustainability. IoT-enabled irrigation systems have significantly enhanced the environmental performance of cotton fields, contributing to more sustainable agricultural practices. Farmers should adopt these technologies for long-term benefits in terms of water conservation and ecological stability. Agriculture, IoT, Irrigation Systems, Environmental Benefits, Sustainability The maintenance outcome was modelled as $Y\{\}=beta\,0+beta\,1\,X\{\}+ui+varepsilon\{\}$, with robustness checked using heteroskedasticity-consistent errors.

Keywords: *Geographical Information Systems (GIS), Precision Agriculture, Sensor Networks, Sustainable Farming Practices, Remote Sensing Technology, Data Analytics, Climate Resilience*

ABSTRACT-ONLY PUBLICATION

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