



Solar-Powered Irrigation Systems Adoption Dynamics and Financial Viability among Northern Ugandan Smallholders: A Theoretical Framework

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Abstract

Solar-powered irrigation systems are increasingly being adopted by smallholder farmers in northern Uganda to enhance agricultural productivity and resilience against climate change. Theoretical analysis will be employed to construct the framework based on existing literature and expert insights in agricultural economics, renewable energy, and smallholder farming practices. The theoretical framework will provide insights into how different factors influence adoption rates and long-term financial outcomes, offering a basis for future research and policy recommendations. Policy makers should consider subsidies or incentives that address perceived barriers such as initial investment costs and system maintenance knowledge gaps to increase adoption rates.

Keywords: *African geography, adoption dynamics, irrigation systems, smallholder farmers, sustainable development, econometrics, resource management*

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