



Gender Dynamics in Solar-Powered Irrigation Schemes among Niger Delta Smallholders: A Theoretical Framework

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Abstract

Solar-powered irrigation schemes are increasingly adopted by smallholder farmers in the Niger Delta region of Nigeria to improve agricultural productivity and sustainability. However, gender dynamics remain underexplored, despite their significant impact on scheme outcomes. Understanding these dynamics is crucial for designing more inclusive solar-powered irrigation schemes that can enhance agricultural productivity and sustainability among smallholder farmers, especially women. Inclusive design strategies should include targeted training programmes for women on solar technology maintenance and operation, as well as community-level interventions to reduce socio-cultural barriers. Policies promoting electrification in rural areas are also recommended to increase access to solar energy. The empirical specification follows $Y = \beta_{0+\beta} X + \text{varepsilon}$, and inference is reported with uncertainty-aware statistical criteria.

Keywords: *Niger, Gender Dynamics, Solar Energy, Smallholders, Irrigation, Development Studies, Empowerment Analysis*

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