



Efficacy Assessment of Solar-Powered Irrigation Systems on Agricultural Productivity among Smallholder Farmers in Northern Ethiopia: A Survey Study

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Abstract

Solar-powered irrigation systems have been introduced to enhance agricultural productivity in developing countries, particularly among smallholder farmers who lack access to conventional power sources. The research employs a mixed-methods approach, including surveys and interviews with 200 randomly selected smallholder farmers. Data collection was conducted through structured questionnaires addressing system performance, farmer perceptions, and yield outcomes. A notable proportion (68%) of respondents reported increased agricultural yields since adopting solar-powered irrigation systems, suggesting a positive correlation between the technology and productivity enhancements. Solar-powered irrigation systems have demonstrated significant potential in improving agricultural productivity among smallholder farmers in Northern Ethiopia. The study supports further investment and policy support for such technologies. Government agencies should prioritise the provision of solar-powered irrigation infrastructure, while development organizations should invest in farmer training programmes to maximise system benefits. Agricultural Productivity, Solar-Powered Irrigation Systems, Smallholder Farmers, Northern Ethiopia

Keywords: *African, Geographical, Irrigation, Smallholder, Systematic, Technological, Validation*

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