African Learning Design

Smart Irrigation Systems for Ethiopian Coffee Farmers: Economic Returns and Satisfaction Analysis

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Abstract

The Ethiopian coffee sector is pivotal to local economies in mountainous regions where climate variability affects crop yields and farmer livelihoods. A mixed-method approach combining cost-benefit analysis (CBA) and structured surveys was employed to gather data from a representative sample of coffee-growing communities in Ethiopia's mountainous regions. Smart irrigation systems showed an average annual return on investment of $1{,}200\ per\ \frac{hectare}{five}\ years\ ,\ with\ farmer\ satisfaction\ scores\ ranging\ between\ 75\,\% \wedge 85\,\% .\ The\ smart\ irrigation\ syste$ Y{it}=\beta0+\beta1X{it}+ui+\varepsilon{it}$, with robustness checked using heteroskedasticity-consistent errors.

Keywords: *Ethiopia, Smart Irrigation Systems, Precision Agriculture, Cost-Benefit Analysis, Farmer Surveys, Quantitative Methods, Qualitative Research, Participatory Action Research*

ABSTRACT-ONLY PUBLICATION

This is an abstract-only publication. The complete research paper with full methodology, results, discussion, and references is available upon request.

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