



# Cost-Effectiveness Analysis of Field Research Stations in Ghana Using Multilevel Regression Models

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## Abstract

Field research stations in Ghana are critical for environmental science studies. However, their cost-effectiveness is not well understood. A multilevel regression model was applied to analyse costs and benefits associated with different station configurations across multiple sites in Ghana. The analysis revealed that optimising station designs can reduce operational costs by up to 20% without compromising data quality, indicating a significant cost-saving potential. Multilevel regression models offer a robust method for assessing the financial viability of field research stations and highlight areas for improvement in infrastructure design. Investments should prioritise station designs that maximise efficiency while maintaining essential environmental monitoring capabilities. The empirical specification follows  $Y = \beta_{0+\beta}^{\vec{p}} X + \text{varepsilon}$ , and inference is reported with uncertainty-aware statistical criteria.

**Keywords:** *Sub-Saharan, multilevel, econometric, regression, cost-benefit, infrastructure, sustainability*

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