African Social Geography (Geography/Social)

Feasibility and Implementation of Hydro-Powered Lighting Systems in Northern Nigerian Communities Revisited

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Abstract

Previous studies have evaluated the economic feasibility of hydro-powered village lighting systems in northern Nigerian communities, but variations in implementation and cost-benefit analysis are evident. The replication study employs a mixed-methods approach, combining quantitative cost-benefit analysis with qualitative interviews to assess system implementation and user satisfaction in selected communities. A regression model predicting the return on investment (ROI) for hydro-powered lighting systems indicates an average ROI of 150% over five years with robust standard errors. The replication study confirms the economic feasibility of hydro-powered village lighting systems, highlighting cost savings and improved energy access as key benefits in northern Nigerian communities. Policy makers should consider implementing these systems in conjunction with government subsidies to ensure widespread adoption and sustainability. The empirical specification follows $Y = \beta_{0+\beta}^{\rightarrow} p\, X + varepsilon$, and inference is reported with uncertainty-aware statistical criteria.

Keywords: *African Geography, Hydro-Electric Power, Renewable Energy, Cost-Benefit Analysis, Implementation Studies, Economic Evaluation, Geographic Information Systems*

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