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Methodological Evaluation of Field Research Stations Systems in Rwanda: Difference-in-Differences Model for System Reliability Assessment

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Abstract

Field research stations in Rwanda have been established to monitor environmental changes over time. However, their effectiveness varies among different regions and periods. We employed a Difference-in-Differences (DiD) econometric model to assess the impact of established research stations on environmental data collection. The DiD model controls for potential confounding factors such as regional variations in climate and human activity. The analysis revealed that the reliability of field research station systems improved by 15% in regions with consistent monitoring over five years, compared to areas without long-term monitoring programmes. Our findings suggest that systematic data collection from established stations is crucial for accurate environmental trend assessments and policy-making. To enhance system reliability, we recommend extending the duration of research station operations in all regions and integrating more advanced technologies into current systems. The empirical specification follows $Y = \vec{\beta_{0+\beta}} \, p \, X + varepsilon$, and inference is reported with uncertainty-aware statistical criteria.

Keywords: *Rwanda, Geographic Information Systems (GIS), Randomized Controlled Trials (RCTs), Quantitative Methods, Qualitative Research, Participatory Monitoring and Evaluation (PME), Temporal Analysis*

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