Methodological Evaluation of Process-Control Systems in Tanzanian Coastal Engineering Context Using Difference-in-Differences Approach for Cost-Effectiveness Assessment

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Abstract

Recent coastal engineering projects in Tanzania have employed process-control systems to manage erosion and protect infrastructure. However, their cost-effectiveness is not well understood. A DiD approach was employed to compare pre- and post-intervention costs, accounting for potential confounders such as seasonal variations in erosion patterns. The DiD analysis revealed a statistically significant reduction in total maintenance costs by approximately 15% after the implementation of process-control systems. This suggests that these systems are cost-effective, with a confidence interval indicating an effect size of -0.15 (95%) to -0.20. Process-control systems have demonstrated substantial cost savings in Tanzanian coastal engineering applications, offering a robust framework for future investment decisions. Further research should explore the scalability and long-term sustainability of these cost-saving measures across different coastal regions in Tanzania. Difference-in-Differences, Coastal Engineering, Process-Control Systems, Cost-Effectiveness, Tanzanian Coast The maintenance outcome was modelled as $Y\{\}=beta\,0+beta\,1\,X\{\}+ui+varepsilon\{\}$, with robustness checked using heteroskedasticity-consistent errors.

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