African Transportation Engineering

Methodological Assessment of Water Treatment Facilities Systems in Rwanda: A Randomized Field Trial on System Reliability

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Abstract

Water treatment facilities in Rwanda face challenges related to system reliability, leading to inconsistent water quality and supply disruptions. A mixed-method approach combining quantitative data analysis with qualitative observations was employed. A statistical model was used to estimate the probability of system failure over time ($P = Pr(system\ failure) = \beta 0 + \beta 1\, time)$. The robust standard errors account for potential heteroscedasticity in the dataset. System reliability varied significantly across different facilities, with a mean probability of failure estimated at 5.2% per year. The randomized field trial provided valuable insights into the operational performance of water treatment systems in Rwanda, highlighting areas for improvement and suggesting strategies to enhance system reliability. Future policy should prioritise interventions that address identified weaknesses in system design and maintenance protocols to improve overall reliability.

Keywords: *Geographic, Africa, Water, Sanitation, Systems, Mixed-Methods*

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