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Methodological Evaluation of Process-Control Systems in Rwanda Using Difference-in-Differences Models for Risk Reduction Analysis

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Abstract

Process-control systems are critical in ensuring safety and efficiency in various industrial processes. In Rwanda, these systems play a significant role in maritime operations, particularly in safeguarding vessels and personnel from risks such as collision and grounding. The study employs DID models to analyse pre- and post-intervention data from selected maritime facilities in Rwanda. This approach allows us to isolate the effect of the process-control system by comparing changes within and between groups that received the intervention and those that did not. Our analysis indicates a statistically significant reduction (p-value < 0.05) in reported accidents post-intervention, suggesting an effective risk-reduction strategy implemented through these systems. The results from the DID models support the efficacy of process-control systems in enhancing maritime safety and operational efficiency in Rwanda. Based on this study, we recommend further implementation and continuous monitoring of these systems to sustain their benefits and address any emerging challenges. The maintenance outcome was modelled as $Y\{\}=beta0+beta1X\{\}+ui+varepsilon\{\}$, with robustness checked using heteroskedasticity-consistent errors.

Keywords: *Geographic, Africa, Industrial, safety, efficiency, Difference-in-Differences, evaluation, methodology*

ABSTRACT-ONLY PUBLICATION

This is an abstract-only publication. The complete research paper with full methodology, results, discussion, and references is available upon request.

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