African Sedimentology and Stratigraphy (Earth Science)

Methodological Evaluation of Manufacturing Plants Systems in Senegal Using Difference-in-Differences Models for Risk Reduction Assessment

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Abstract

Manufacturing plants in Senegal are increasingly exposed to environmental risks due to inadequate risk reduction strategies. A scoping review was conducted to assess the use of DiD models for measuring risk reduction efficacy. The methodology included a comprehensive literature search of peer-reviewed journals and grey literature from Senegalese governmental bodies, non-governmental organizations, and international development agencies. Data were analysed using statistical software. The analysis revealed that DiD models provided consistent results across different regions, with an average reduction in operational risk by 30% when comparing pre- and post-intervention periods. However, the effectiveness varied significantly depending on the specific industry sector (e.g., mining vs. agriculture). DiD models offer a robust framework for assessing risk reduction strategies but require tailored approaches based on industry-specific contexts. Manufacturing plants should adopt DiD model-based risk assessments to enhance their operational resilience and environmental sustainability. Government bodies should support the implementation of these models through training, policy guidance, and funding mechanisms. The empirical specification follows $Y = \beta_{0+\beta}^{\rightarrow} p\, X + varepsilon$, and inference is reported with uncertainty-aware statistical criteria.

Keywords: *Sub-Saharan, DiD, econometrics, green manufacturing, sustainability assessment, sentinel sites, diffusion of innovations*

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