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Methodological Evaluation of Manufacturing Systems Reliability in Senegal: A Multilevel Regression Analysis

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Abstract

Manufacturing systems in Senegal are critical for economic development but face challenges related to reliability and efficiency. A systematic literature review was conducted using databases such as Web of Science and Scopus to identify relevant studies. Studies were selected based on rigorous methodologies and clear reporting of reliability metrics. Multilevel regression models showed significant variance in system reliability due to both plant-level factors (e.g., maintenance frequency) and industry sector differences (manufacturing vs. services). The use of multilevel regression analysis provided a nuanced understanding of manufacturing systems' reliability, revealing the importance of considering multiple levels of influence. Future studies should consider expanding the scope to include additional factors such as geographic location and economic indicators that may impact system reliability. Manufacturing Systems, Reliability Analysis, Multilevel Regression, Senegal The empirical specification follows $Y = \beta_{0+\beta}^{\rightarrow} p\, X + varepsilon$, and inference is reported with uncertainty-aware statistical criteria.

Keywords: *Sub-Saharan, manufacturing, reliability, efficiency, multilevel analysis, econometrics, geographic* □□ □□

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