



Methodological Evaluation of Process-Control Systems in South Africa Using Quasi-Experimental Design for Risk Reduction Assessment

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Abstract

Process-control systems are critical in manufacturing engineering to ensure quality and safety. In South Africa, their effectiveness varies significantly. A quasi-experimental design was employed with data from 150 South African manufacturing facilities. Process performance metrics were collected over two years to measure the impact of control systems on risk levels. An analysis revealed that the implementation of advanced process-control systems led to a significant reduction in production defects by 20%, indicating improved operational efficiency and quality controls. The quasi-experimental design provided robust evidence for the effectiveness of process-control systems in mitigating manufacturing risks, offering practical insights for industry improvement. Manufacturers should consider adopting or upgrading their process-control systems to enhance risk reduction strategies. Process-Control Systems, Quasi-Experimental Design, Risk Reduction, Manufacturing Engineering, South Africa The maintenance outcome was modelled as $Y = \beta_0 + \beta_1 X + u_i + \epsilon_i$, with robustness checked using heteroskedasticity-consistent errors.

Keywords: *Sub-Saharan, econometric, intervention, causality, econometrics, randomized, evaluation*

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