



Methodological Assessment and Panel Data Estimation of Manufacturing Plant Systems in South Africa

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Abstract

Manufacturing plants in South Africa face significant operational challenges that affect productivity and competitiveness. The study employs mixed-methods including econometric analysis with the Fixed Effects (FE) model. Uncertainty is addressed through robust standard errors. Panel-data estimation revealed a moderate adoption rate of advanced manufacturing technologies in South African plants, indicating potential for further technological integration. This research provides foundational insights into methodological approaches for assessing and enhancing manufacturing systems in South Africa. Further studies should explore the specific factors influencing technology adoption among different sectors and regions within South Africa. Manufacturing, Panel data, Econometrics, Adoption rates, South Africa The maintenance outcome was modelled as $Y_{it} = \beta_0 + \beta_1 X_{it} + u_i + \epsilon_{it}$, with robustness checked using heteroskedasticity-consistent errors.

Keywords: *Sub-Saharan, African, Econometrics, Panel-Data, Methodology, Productivity, Fixed-effects*

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