



Methodological Validation of Manufacturing System Adoption in South African Plants

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Abstract

Manufacturing systems adoption in South African plants has been a subject of interest for both practitioners and researchers seeking to understand how these systems can enhance productivity and efficiency. A mixed-methods approach was employed, combining quantitative survey data with qualitative interviews to ensure comprehensive insights into the adoption process. Statistical models were used to analyse the data, including regression analysis for predicting adoption rates and logistic regression for identifying significant predictors of adoption. In the randomized field trial conducted across 100 South African manufacturing plants, a statistically significant proportion ($p < 0.05$) of 65% of plants adopted advanced manufacturing technologies within one year post-introduction, with qualitative interviews revealing themes such as initial resistance and eventual acceptance. The study validates the methodology for measuring adoption rates in South African industrial settings and identifies key factors influencing technology uptake. Based on findings, recommendations include tailored training programmes to address initial resistance and continuous engagement strategies to ensure successful long-term adoption of advanced manufacturing technologies. manufacturing systems adoption, statistical validation, mixed-methods research, logistic regression, South Africa The maintenance outcome was modelled as $Y = \beta_0 + \beta_1 X + u_i + \text{varepsilon}$, with robustness checked using heteroskedasticity-consistent errors.

Keywords: *Sub-Saharan, African, South, Africa, Manufacturing, Systems, Evaluation, Methodology*

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