



Methodological Assessment of Manufacturing Plant Systems in Tanzanian Industries Using Panel Data for Efficiency Gains Analysis

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Abstract

Manufacturing plants in Tanzania face challenges related to operational efficiency, which can hinder economic growth and competitiveness within the country's industrial sector. The research employs a fixed effects regression model to analyse panel data from multiple manufacturing plants over several years. Uncertainty is addressed through robust standard errors, ensuring reliable estimates of efficiency gains. Panel-data estimation revealed significant variations in energy consumption patterns among plants, with some exhibiting up to 30% potential for efficiency improvement. The study underscores the importance of adopting best practices and implementing technological upgrades to enhance overall operational efficiency in Tanzanian manufacturing industries. Adopting advanced energy management systems and conducting regular maintenance checks are recommended strategies to achieve these improvements. Collaboration with international partners is also suggested for knowledge exchange and technology transfer. The empirical specification follows $Y = \beta_{0+\beta}^{-} p X + \text{varepsilon}$, and inference is reported with uncertainty-aware statistical criteria.

Keywords: Panel data, African economics, productivity enhancement, econometrics, industrial organisation, resource allocation, growth theory

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