African Food Engineering (Food Science/Technology)

Methodological Evaluation of Manufacturing Systems in Ugandan Plants Using Panel Data for Reliability Measurement

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Abstract

Manufacturing systems in Ugandan plants are crucial for food production, but their reliability varies significantly. Panel data was collected from Ugandan plants over two years. A mixed-effects logistic regression model was employed to analyse the data, accounting for both fixed effects (plant-specific characteristics) and random effects (time-invariant factors). The analysis revealed that plant age had a significant impact on system reliability, with older plants showing lower reliability. Panel-data estimation successfully identified key drivers of manufacturing system reliability in Ugandan contexts. Investment strategies should focus on upgrading older plants to improve overall system performance and reduce reliability issues. Uganda, Manufacturing systems, Panel data, Reliability measurement The maintenance outcome was modelled as $Y\{\} = beta\,0 + beta\,1\,X\{\} + ui + varepsilon\{\}$, with robustness checked using heteroskedasticity-consistent errors.

Keywords: *Uganda, Manufacturing Systems, Panel Data, Mixed-Effects Models, Reliability Measurement, Econometrics, Methodology*

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