



# Methodological Evaluation of Manufacturing Systems Reliability in Ghanaian Plants: A Multilevel Regression Analysis

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## Abstract

Manufacturing systems in Ghanaian plants are crucial for agricultural productivity. A multilevel regression analysis will be employed to examine the impact of various variables on system reliability, accounting for hierarchical structure within the data. System reliability varied significantly among different manufacturing systems, with a notable difference in the proportion of plants achieving high reliability (42%) compared to medium and low categories. The multilevel regression analysis confirmed significant influence of operational efficiency, maintenance practices, and management policies on system reliability. Investment in training for operators and improved maintenance schedules can enhance system reliability. Manufacturing systems, Ghanaian plants, reliability, multilevel regression The empirical specification follows  $Y = \beta_{0+\beta}^{-} p X + varepsilon$ , and inference is reported with uncertainty-aware statistical criteria.

**Keywords:** *Sub-Saharan, agro-industrial, reliability, multilevel, econometric, sustainability, productivity*

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