African Crop Science (Agri/Plant Science)

Methodological Evaluation of Manufacturing Plants Systems Adoption in Ethiopian Agriculture: A Multilevel Regression Analysis

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Abstract

Manufacturing plants systems have been adopted in various agricultural settings to enhance productivity and efficiency. A multilevel logistic regression model was employed to analyse data collected from a stratified random sample of 500 farmers across Ethiopia's main agricultural zones. The model accounted for hierarchical data structure with fixed effects for household-level variables and random intercepts for commune-level variation. The analysis revealed that the proportion of farmers adopting manufacturing plants systems was significantly higher in regions with better access to irrigation, indicating a positive correlation between water availability and adoption rates ($p < 0.01$; OR = 1.25, CI: 1.08-1.45). The multilevel regression model successfully captured the complex interplay of individual and contextual factors influencing manufacturing plants system adoption in Ethiopian agriculture. Future research should explore interventions targeting regions with lower adoption rates to increase overall uptake, while policymakers could consider enhancing irrigation infrastructure as a key strategy for promoting these systems. manufacturing plants, multilevel regression, agricultural efficiency, Ethiopia

Keywords: *African agriculture, adoption rates, multilevel analysis, regression models, supply chain management, productivity enhancement, sustainable farming practices*

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