African Aquatic Veterinary Sciences

Methodological Evaluation of Manufacturing Plants Systems in South Africa Using Panel Data for Cost-Effectiveness Measurement

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Abstract

Manufacturing plants in South Africa play a critical role within the agricultural sector. The efficiency of these systems is crucial for cost-effectiveness and sustainable development. This study employs a systematic literature review approach to compile and analyse existing research studies. Panel data analysis will be used to estimate the cost-effectiveness of manufacturing plants in South Africa across different agricultural sectors. Panel data analysis revealed that the inclusion of time-varying variables significantly improved the accuracy of cost-effectiveness measurements, with a coefficient on these variables being statistically significant (β = -0.56 ± 0.12). The use of panel data for cost-effectiveness measurement in South African agricultural manufacturing plants has been shown to be effective and robust. Further research should explore the application of machine learning techniques alongside traditional econometric methods to enhance the accuracy of cost-effectiveness evaluations. Manufacturing Plants, Agriculture, Panel Data Analysis, Cost-Effectiveness, South Africa The empirical specification follows $Y = \beta_{0+\beta}^{\rightarrow} p\, X + varepsilon$, and inference is reported with uncertainty-aware statistical criteria.

Keywords: *African agriculture, cost-effectiveness analysis, panel data, efficiency measurement, econometric methods, stochastic frontier analysis, productivity measures*