



Methodological Evaluation of Manufacturing Plant Systems Adoption in South Africa Using Multilevel Regression Analysis

Mpho Mokgoro¹, Tshego Mogapi¹, Siphon Mota^{2,3}

¹ University of KwaZulu-Natal

² Department of Animal Science, Stellenbosch University

³ Department of Soil Science, University of KwaZulu-Natal

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Correspondence: mmokgoro@hotmail.com

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Author notes

Mpho Mokgoro is affiliated with University of KwaZulu-Natal and focuses on Agriculture research in Africa.

Tshego Mogapi is affiliated with University of KwaZulu-Natal and focuses on Agriculture research in Africa.

Siphon Mota is affiliated with Department of Animal Science, Stellenbosch University and focuses on Agriculture research in Africa.

Abstract

Manufacturing plant systems have been adopted in various industries to enhance efficiency and productivity, but adoption rates vary across different contexts. A mixed-method approach combining quantitative survey data from 150 farms and qualitative interviews with 30 farm managers was employed to assess system adoption rates. Multilevel regression analysis revealed that farm size ($n = 150$) had a significant positive effect on the likelihood of adopting manufacturing plant systems, with larger farms adopting these systems compared to smaller ones. The multilevel regression model provided robust estimates for adoption rates and identified key factors influencing system uptake in South African agriculture. Future research should explore the specific mechanisms through which farm size influences adoption rates and consider integrating technology training programmes into agricultural extension services.

Keywords: African agriculture, agro-industrial systems, multilevel modelling, organisational behaviour, productivity enhancement, statistical methods, system dynamics

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