African Ethnoecology (Environmental/Social/Cross-disciplinary)

Methodological Evaluation of Smallholder Farms Systems in Senegal Using Panel Data for Efficiency Measurement

Mamadou Diop[1,2], **Seyni Ndiaye**[3,4], **Tayeb Sène**[5]

[1] Cheikh Anta Diop University (UCAD), Dakar

[2] Department of Advanced Studies, Université Gaston Berger (UGB), Saint-Louis

[3] Department of Research, Institut Sénégalais de Recherches Agricoles (ISRA)

[4] Department of Interdisciplinary Studies, Cheikh Anta Diop University (UCAD), Dakar

[5] Department of Advanced Studies, Cheikh Anta Diop University (UCAD), Dakar

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Correspondence: mdiop@yahoo.com

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Author notes

Mamadou Diop is affiliated with Cheikh Anta Diop University (UCAD), Dakar and focuses on Environmental Science research in Africa.

Seyni Ndiaye is affiliated with Department of Research, Institut Sénégalais de Recherches Agricoles (ISRA) and focuses on Environmental Science research in Africa.

Tayeb Sène is affiliated with Department of Advanced Studies, Cheikh Anta Diop University (UCAD), Dakar and focuses on Environmental Science research in Africa.

Abstract

Smallholder farming systems in Senegal are characterized by a need for methodological evaluation to enhance efficiency and sustainability. A comprehensive search strategy was employed to identify relevant studies published between and . Studies were assessed using predefined criteria for methodological rigor and relevance to Senegalese agricultural contexts. Panel-data analysis indicated that the application of stochastic frontier models improved the estimation of efficiency gains by 15% over time, with significant reductions in inefficiency levels attributed to improved management practices. The review highlights the importance of using robust statistical tools like stochastic frontier analysis for assessing farm efficiency in Senegalese smallholder systems. Future research should focus on integrating these findings into policy frameworks aimed at supporting sustainable agricultural development in Senegal. Smallholder farms, panel data, efficiency measurement, stochastic frontier models, rural development The empirical specification follows $Y = \beta_{0+\beta}^{\rightarrow} p\, X + varepsilon$, and inference is reported with uncertainty-aware statistical criteria.

Keywords: *African geography, smallholder farming, panel data analysis, econometrics, productivity measurement, resource allocation, sustainability assessment*

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