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Rice Productivity and Technical Efficiency: A Meta-Frontier Analysis of Rice Farms in Northern Ghana

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Abstract

Among the cereals produced in Ghana, rice presents the best opportunity to rapidly increase food production. This is because current yields are far below potential due to low productivity on most rice farms. And despite several policy interventions, rice productivity and self-sufficiency are still low. This study examines the productivity, and technical efficiency differentials among a cross-section of 788 rice-producing households, consisting of 324 and 464 farmers in the forest-savannah transition and the savannah agro-ecological zones of Northern Ghana respectively. The study applies the stochastic frontier approach to assess the productivity of inputs used, technical efficiency, and the determinants of technical inefficiency. It further uses the stochastic meta-frontier approach to measure the technology gap ratios. The results reveal that rice farms in both agro-ecological zones exhibit decreasing returns to scale. The stochastic frontier estimates reveal that the mean technical efficiency for farms in the forest-savannah transition and the savannah agro-ecological zones are 0.61 and 0.88 respectively. The stochastic meta-frontier estimates show that the mean technical efficiency relative to the meta-frontier are 0.58 and 0.52 for farms in the forest-savannah transition and the savannah zones respectively. The study therefore concludes that rice farms in the forest-savannah transition zone are technically less inefficient than their counterparts in the savannah zone. The results further show that farm ownership, participation in rice training programs, rice monoculture and selling rice at the farm gate reduce technical inefficiency. Technical inefficiency is however increased by engaging in off farm activities, bund construction around the farm and the distance of the farm from the farmer. The study recommends the use of proper land tenure security arrangements aimed at ensuring easy access of farmers to land for rice cultivation. Policy makers should also focus on policies that will enhance rice farmers' access to ready markets to sell their produce. Households engaged in off-farm income generating activities are encouraged to invest their time and cash in farm operations as a way of contributing to the efficiency of agricultural production systems. These are issues that future policies and programs may have to consider in the quest to improve farm-level performance.

Keywords: Meta-frontier, productivity, stochastic frontier, technical efficiency, technology gap