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Environmental and technical efficiency in agricultural production in Asia

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Abstract

Although the agricultural sector contributes to economic development and livelihood, pollution in the agricultural sector can result in a number of environmental and health risks. As a result, improving agricultural productivity while avoiding environmental degradation is currently one of the primary priorities of Asian countries depending on agriculture. Therefore, this study attempted to examine both the technical and environmental efficiency of agricultural production in Asia using a stochastic frontier analysis with a panel data set consisting of 48 Asian countries from 1990 to 2018. According to the findings, all considered factors of production *viz.* land, labor, fertilizer, and pesticides show a positive impact on agricultural production while the total agricultural production is highly dependent on fertilizer use. The average technical efficiency of agricultural production in Asia is 71% and ranges from 69 to 75%. This indicates that countries are on average executing about 71% of best practice output in their use of agricultural inputs and technology. Nonetheless, there is still potential for increased agricultural productivity with the same levels of inputs and technology. The chemical pesticide is treated as the only environmentally harmful input for calculating environmental efficiency. The typical value of environmental efficiency for ecologically harmful input ranges from 20% to 25%, with an average value of 22%. The low environmental efficiency shows that the agricultural production value could be maintained by reducing the pesticide input use by 78% while using observed values of other inputs. Therefore, there is a great potential for reducing the environmental impact of agricultural production by the optimum use of pesticides and enhancing the environmental efficiency of Agriculture in Asia. Technical and environmental efficiency scores follow the same pattern, with small diminishing tendencies over time. The findings demonstrate the value of reallocating input resources such as pesticide inputs and enhancing agricultural environmental efficiency. As a result, ecologically harmful inputs should be used in a sustainable manner to minimize the negative externalities of agricultural production on the environment.

Keywords: Agriculture, Environmental efficiency, Stochastic frontier analysis, Technical efficiency

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