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REVIEW ARTICLE

Economic efficiency of wheat production in Gezira scheme, Sudan ☆

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Technical efficiency;
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variability

Abstract This study was carried out in Gezira scheme (season 2007/08) to measure the farmer's technical efficiency of producing wheat and to determine the main socio-economic factors affecting farmer's technical efficiency of wheat production. The stochastic production frontier model was employed to achieve the study objectives. Primary data was collected from a random sample of 60 farmers in the Gezira scheme by mean of a structured questionnaire. The primary data was supplemented by secondary data collected from different relevant sources. The study results showed that the mean technical efficiency of wheat production is 63% which means that wheat production could have been increased by 37% at the same level of inputs, had resources efficiently utilized. The main socio-economic factors determining the farmer's technical efficiency appeared to be: the timing of the different agricultural operations, irrigation and land ownership.

To improve wheat production technical efficiency, the study recommended usage of wheat improved varieties and application of the different agricultural operations, particularly land preparation and irrigation, at the optimum timing.

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1. Introduction

The agricultural sector is the mainstay of the Sudanese economy. It contributes about 41% of the GDP, 80% of exports (excluding oil). Agriculture employs 65% the labor force and provides 50% of the raw material for the industrial sector. Although these contributions seem substantial, but they are considered humble, compared to the natural resources and potentialities of the sector. This modest performance is due to inadequate investments in agriculture which is manifested in poor infrastructure, low technical capacities of labor force, poor support services including research and extension and shortages of the necessary inputs such as improved seed, and fertilizers.

The Gezira scheme has always been encumbered by a unique institutional setup which reduced the managerial and economic efficiency of the scheme. The current production relations, including centralized decision-making on production and marketing of major crops and centralized management of irrigation water limit the options of farmers for an efficient allocation of resources and affect their benefits substantially. Pan-territorial charges and payments provide fewer incentives for farmers. The performance is further aggravated by the deterioration of the infrastructure and absence of technical progress.

As a result, inefficient and wasteful water distribution became the rule and expansion in acreage and productivity of crops was limited. A typical farm has become unable to provide an income above the poverty line for an average family in Gezira scheme. Educated farmers have found alternative income sources and do not rely fully on agriculture for their livelihood (Rahman, 2002). In line with this, some other studies found that the major factors contributing to efficiency of production were age of farmers, level of education and family size.

Wheat cultivation has been known in northern Sudan but the area cultivated has never exceeded 1500 ha up to the end of the fifties. The output was enough to cover the consumption needs in northern Sudan and the main towns. The rest of the population depends on sorghum in central and eastern Sudan, dukhn in the west and cassava in the south. All these crops, with the exception of wheat are produced under rains (Ministry of Agriculture and Forestry, 2007). Wheat consumption in Sudan has been sharply increasing from about 220,000 ton in 1970/71 to about 2,000,000 ton in 2007, due to the population growth and the rising per capita consumption. However, in the following years of policy liberalization and issuing inflation, the cost of production became prohibitive and wheat production was sharply reduced prompting the country to import most of its wheat requirements. At present, the Gezira scheme produces more than 50% of the country's wheat production;

the rest is produced in the Northern and Nile states in addition to little areas in Rahad and New Halfa schemes (Ministry of Agriculture and Forestry, 2007).

The Sudan wheat situation is characterized by rapid consumption growth, continuous and variable deficit between domestic needs and local production and uncertain estimates of actual wheat demand due to quota and price control. Current average wheat yields are quite variable and substantially lower than the potential. Space variability, induced by confounded effects of location, management and tenant preferences, call for some level of specialization and vertical increase in production in contrast to the current area expansion strategies (Faki, 1996).

1.1. Definitions of terms

This part defines some terms that are commonly used in efficiency analysis.

The efficiency analysis, in general, focuses on the possibility of producing a certain level of output at the lowest cost or producing an optimal level of output from a given resources (Russell and Young, 1983).

Economic efficiency (EE) is the degree or ability of a farmer to produce a given level of output at the least cost. EE could be divided into allocative efficiency (AE) and technical efficiency (TE) (Farrell, 1957). AE refers to the appropriate choice of input combination. A farm is allocatively efficient if production inputs are allocated according to their relative prices. TE refers to the proper choice of production function among all those actively in use by farmers. A farm is technically efficient if it produces the maximum obtainable output level from a certain amount of inputs, given its technology.

The stochastic production frontier is an econometric technique that allows the measurement of efficiency as defined by the ratio of observed output to the estimated (maximum) output, defined by the frontier production function, given inputs and stochastic nature of production.

2. Objectives

The main objective of this study was to measure the economic efficiency of wheat production in Gezira scheme and to explain the possibilities of increasing productivity and profitability of wheat by increasing the farmer's efficiency in production. Specifically, the study tried to measure wheat production technical efficiency and identifies its determinants and the main factors affecting it. In addition, the study tried to come out with policy recommendation to help decision-makers increase what productivity in Gezira a scheme.

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