Evaluation of the privatization of government agricultural schemes in the River Nile State, Sudan: A case study of wheat resource utilization

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Abstract

This study was carried out to measure the effect of privatization policy on the socio-economic situation of producing wheat by tenants in the River Nile State through direct comparison with the private small pump schemes where farmers managed their farms privately and had attained a considerable experience in this field. Stratified sampling method was used to collect data from the selected schemes in the River Nile State during season 2007/08. Multiple regression methods were used to estimate the wheat cost function for privatized and small private pumps schemes. The results of the wheat cost function multiple regression analysis showed that the private small pumps schemes were more close to the optimal productivity, whereas, the difference between the economic productivity level and the achieved productivity was 55% for the privatized schemes and 32% for the private small pumps schemes, indicating that small farmers were utilizing their resources more efficiently than the privatized tenants. Hence, the study recommended more rehabilitation efforts to be taken to raise the capacity of the irrigation and drainage systems, and have more access to inputs to benefit from the economies of scale.

Introduction

Privatization policy aimed to transfer control and management of public enterprises to the private sector as a part of the economic reform program of the World Bank (WB) and the International Monetary Fund (IMF). Since its introduction by Britain’s Thatcher government in the early 1980s, privatization is one of the most important elements of the continuing global phenomenon of the increasing use of markets to allocate resources (Megginson and Netter, 2001). Nellis and Shirley (1992) noted that privatization is not a blanket solution for the problems of poorly performing State-Owned Enterprises (SOEs). On the other hand, some writers refused the prevailing believe that the efficiency of resource distribution will be improved by the application of privatization (AOAD, 2000).
In Sudan, since the mid 1980’s the state – owned enterprises performance began to deteriorate and have become a burden on the national economy, justifying the adoption of privatization policy. Agriculture, being the most important potential contributor to the economic growth (36.5% of the GDP in 2009), received a considerable attention on privatization policy action, in order to increase economic efficiency and promote the agricultural production to obtain positive effects on crop yield, farmer income, management and asset ownership.

Privatization in agriculture took different forms. Firstly, the gradual transfer and disposition of highly costly centers like The Agricultural Engineering Department of the Gezeira scheme and Gezeira railways. Secondly, the complete transfer of assets to farmer associations. This type included the White and Blue Nile Corporation. Lastly, the immediate dissolution of corporations like the Delta Toker, El-Gash, Nuba Mountain Corporation and Northern Agricultural Production Corporation [NAPC] (Federal Ministry of Finance and National Economy, 2005a)

By 2005, 81 enterprises were privatized of which 26% were agricultural schemes (Federal Ministry of Finance and National Economy, 2005a). Many of the privatized enterprises in the agricultural sector (9 out of 21) were disposed of by transferring their ownership to a governmental organizations or regional governments for free. Technical Committee for the Disposition of Public Enterprise (TCDPE), revealed in its reports – issued in 1997 and 2002 – that the experience of privatization in the agricultural sector was beset by a continuous failure (Federal Ministry of Finance and National Economy, 1997; Federal Ministry of Finance and National Economy, 2002). The main criticism of the privatization program, inside Sudan, relates to the transfer of enterprises to state governments and acquisition of enterprises by those considered to be politically connected (World Bank, 2003). Lack of transparency in land distribution resulted in biased land allocation, which is suggestive of expected inefficiency in land use. However, Federal Ministry of Finance and National Economics (2005b) reported that, the total return of privatized enterprises reached about 0.33 billion SDG by 2005 (the privatization proceeds represent about 3% from the total receipts of government in 2005).

According to the recommendations of the 1992/93 National Salvation Program in its strategy conference held in 1990, the government transferred the ownership of the ten government schemes in the River Nile State under the management of the NAPC to established farmers unions (Anon., 1990). Those schemes were aging and had poor financial position; the new administration was not qualified to meet the financial needs of the rehabilitation and operation of production activities at these schemes. The outcome of this situation was reflected in higher water charges, low crop productivity, smaller areas under cultivation, low income to farmers, and a significant reduction in the number of employees.

The study set forth evaluation of the privatization of the NAPC-schemes (government schemes) in River Nile State through comparing the wheat resource utilization between the privatized schemes and small pump schemes.
Methodology

Survey area and data collection

The primary data were obtained from a field survey of NAPC – schemes and private small pumps schemes in the River Nile State during the season of 2007/08 (Diamantopouls and Schlegelmich, 1997). With regard to sampling, multi-stage stratified random sampling technique was adopted as it gives more precise results because it reduces the variation within each stratum (Heady and Dilon, 1961). The 10 NAPC- schemes were divided into two clusters, one that included the rehabilitated schemes, namely Fadlab, Kelly and Gendettu, and the other cluster included the non-rehabilitated (remaining seven schemes). Data were collected randomly from the farmers of the selected schemes in the cluster. The actual number of farmers interviewed was 150, which represented about 1% of the total 15000 farmers. Farmers and schemes administration were directly interviewed to obtain primary information about location, area, crops planted, varieties, yields, cost of production, prices, and inputs used. Several documents, reports and other sources of information that were related to the study were also used as supplementary information to serve the objectives of the study.

Analytical techniques

There are many types of models that can and often have been used for policy analysis and forecasting, but there are three general classes of models that can be constructed for this purpose: Time-series models, Single-equation regression models and Multi-equation simulation models (Pindyck and Rubinfeld, 1981).

This study applied Single-equation regression model to assess cost functions for wheat planted in the privatized enterprise and in the private small pump schemes where farmers managed their farms privately and had attained a considerable experience in this field. For cost function, polynomial or cubic function was used in the form:

\[ Y = a + bx + cx^2 + dx^3 \]

where:

- \( Y \) = Total cost per feddan, \( X \) = Yield per feddan
- (1 feddan = 0.42 ha)
- \( a \) is a constant representing the total fixed cost.
- \( b, c, \) and \( d \) are constants representing the variable coefficients and they measure the slope at zero points.

The study used the cubic form because it allowed marginal cost to decline by a constant absolute amount and implied more quantitative interpretations for the results obtained by using the second derivative of production function to determine the quantity of yield which minimizes the costs.

Robust regression method was used to provide an alternative to least square regression that work with less restrictive assumptions (data with outliers), it provides much better regression coefficient estimates. Hamilton (1991) stated that, ordinary least square analysis does not perform well when outliers occur; robust regression weighs down the influence of outliers.

The coefficient of multiple determinations \( R^2 \) was u-
sed to measure the proportion of the variation in the dependent variable explained by equation; t-Statistics were used to assess whether the explanatory variables in the model have any significant impact upon the dependent variable.

**Results and discussion**

*Cost function for wheat in privatized farms*

River Nile State Ministry of Agriculture, Animal Resource and Irrigation [RNSMAARI] (2009) reported that, the productivity of the main field crops in the State was less than the potential, the gap between wheat productivity (8.5 sacks) and potential yield (19 sacks) was greater than 50%, hence there was a need for vertical expansion. The study showed that the wheat average yield in small private schemes (9.6 sacks) exceeds its peer in privatized schemes (6 sacks) by almost 60%, which indicated that privatized farms were still facing different problems due to weakness of administrative ability of the farmers in addition to reduction of finance allotted to these schemes.

The objective of this section was to determine the existing situation of production and the economic size of production, which minimizes the average cost of production per feddan and maximizes the yield. The results of the relationship between the wheat total production costs per feddan and the quantity of production for privatized schemes were illustrated in cubic form as follows:

\[
TC = 795.35 + 119.87Y + 17.93Y^2
\]

* (3.92)* (3.70)* (-2.94)*

R - Square = 80%
F - Statistics = 31.76**

* Significant at 5% level.
** Significant at 1% level.

TC = Total costs per feddan (SDG).
Y = Yield per feddan (Sacks).

The level of output, Y, at which the average variable cost and marginal cost reach their minimum, can be calculated (Doll and Orazem, 1978). This characteristic of cost function has enabled the study to drive the following relationships:

The value of output (Y) after which the marginal cost (MC) decreases can be calculated by equating the (MC) slope to zero, from equation (1) above, this quantity can be calculated as follows:

\[
MC = \frac{dTVC}{dY} = 119.87 + 35.86Y - 2.01Y^2
\]

(2)

The first derivative of the above equation equals the slope of the MC curve

\[
\frac{dMC}{dY} = 35.86 - 4.02Y = 0
\]

(3)

Y = 9.0 sacks

The coefficient of the second term (Y) in equation (2) was so high (35.86) such that additions of units of Y were less than compensated for by the small coefficient of \( Y^2 \) (2.01). So the function was increasing up to the level of Y that corresponds to the maximum MC, (9.0sacks), after which the MC decreases indefinitely.

The amount of output Y after which the average variable cost (AVC) decreases can be calculated by equating the slope of AVC curve to zero as illustrated in the following steps:

\[
AVC = \frac{TVC}{Y} = 119.87Y + 17.93Y^2 - 0.67Y^3
\]

(4)

From equation (1)
Y = 119.87 + 17.93Y – 0.67Y^2 \quad (5)

dAVC = 17.93 – 1.34 Y = 0 \quad (6)

Y = 13.4 sacks

As for AVC, it was almost similar to MC finding, the function was increasing up to the level of Y that corresponds to the maximum AVC, (13.4 sacks), after which the AVC decreases indefinitely.

The results of the above equation indicated that the amount of output at the beginning of the rational stage (13.4 sacks) was higher than the existing yield (6 sacks) by 123%. In other words, there was a gap of 55%, which indicated that the production was far from the rational production, which meant that the privatized schemes were not utilizing their available resources economically (Table 1).

Table 1 Comparison of economic volumes of yield per feddan with the existing yield for wheat in privatized farms

<table>
<thead>
<tr>
<th>Yield after which the MC decreases (sacks)</th>
<th>Yield at the beginning of the rational stage (sacks)</th>
<th>Existing yield (sacks)</th>
<th>Gap (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>9.0</td>
<td>13.4</td>
<td>6</td>
<td>55</td>
</tr>
</tbody>
</table>

Source: Author’s survey 2007/08

Cost function for wheat in small schemes

The relationship between wheat total production costs of feddan and the quantity of production for small schemes was illustrated in cubic form as follows:

TC = 22.73 + 236.86Y – 29.19Y^2 + 1.03Y^3 \quad (7)

(7.86) * (8.76) * (9.02) *

R- Square = 92%

F- Statistics = 40.00**

* Significant at 5% level.

** Significant at 1% level.

TC = Total costs per feddan (SDG).

Y = Yield per feddan (Sacks).

The following relationships were derived from the above equation

MC = dTVC = \frac{236.86 – 58.38Y + 3.09Y^2}{dY} \quad (8)

The first derivative of the above equation equals the slope of the MC curve

dMC = – 58.38 + 6.18Y = 0 \quad (9)

Y = 9.4 sacks

Thus, the minimum MC occurs where output equals 9.4 sacks. Similarly, the amount of output Y at which the average variable cost (AVC) reaches its minimum can be calculated by equating the slope of AVC curve to zero as illustrated in the following steps:

AVC = TVC = \frac{236.86Y – 29.19Y^2 + 1.03Y^3}{Y} \quad (10)

= 236.86 – 29.19Y + 1.03Y^2 \quad (11)

dAVC = – 29.19 + 2.06 Y = 0 \quad (12)

Y = 14.2 sacks

The average variable cost reaches its minimum when output, Y, is 14.2 sacks; at this level of output the average variable cost equals marginal cost.

By comparing these economic volumes of yield per feddan with the existing yield which amounted to 9.60 sacks per feddan (Table 2), it became clear that, although the yield at the beginning of the rational stage was higher than the existing yield by 48%
(32% gap), it seemed that the small schemes were about to reach the economic points of production before their peers in the privatized farms. This may be attributed to the effectiveness of management and regular irrigation in addition to the high fertility of the soil. The results indicated that the small schemes are utilizing their available resources more economically than their peers in the privatized farms.

Table 2 Comparison of economic volumes of yield per feddan with the existing yield for wheat in small schemes

<table>
<thead>
<tr>
<th>Yield at the maximum point of MC (sacks)</th>
<th>Yield at the beginning of the rational stage (sacks)</th>
<th>Existing yield (sacks)</th>
<th>Gap (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>9.4</td>
<td>14.2</td>
<td>9.6</td>
<td>32</td>
</tr>
</tbody>
</table>

Source: Author’s survey 2007/08

The results of this study, were also in conformity with the findings of Saad (2007) who, evaluating privatization policy on Blue Nile Agricultural Corporation, found that the high cost per feddan and the traditional mode of production prevailing in the privatized farms in Sinnar indicated inefficient use of resources available in these farms, and subsequently deprived them from attaining economic quantities at earlier stages of production and maximized their profits. Huwaitalla (1998) reported that, companies (the government pumps schemes which have been transformed to agricultural companies since 1996, e.g. Nuri and Elgureir in Merawe, Elkulud and Genatti in Al-Debba locality and Elburgage in Dongola locality) were recorded to work at a lower performance level than the cooperatives and the individuals. It was concluded that the privatization of the government schemes in the River Nile State had not contributed positively to the improvement of wheat production. Hence, the study recommended more rehabilitation efforts to be taken to raise the capacity of the irrigation and drainage systems, and have more access to inputs to benefit from the economies of scale.

References


