Analysis of government policies impact on cotton and wheat production in Gezira Scheme (seasons 2003-2007)

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ABSTRACT

The main objective of this paper was to analyze the impact of the Sudanese government agricultural policies on cotton and wheat production in the GeziraScheme in the seasons 2003-2007 in terms of efficiency, competitiveness and comparative advantages. The study depended on data and information collected from different sources. The policy analysis matrix (PAM) was adopted as an analytical model to achieve the above objective. Nominal protection coefficient of outputs, nominal protection coefficient of inputs, effective protection coefficient, profitability coefficie-nt, domestic resources coefficient and international value added were calculated for the seasons under consideration and compared with those obtained by Adam (1996). The results showed that the government policies discouraged Gezira tenants to produce cotton and its outputs had been subjected to taxes throughout all seasons under consideration, where on the other hand, the government policies provided incentives and favored production of wheat in the Gezira Scheme. Consequently it could be concluded that, although the overall impact of the government polices was tending to be worse regarding the protection and competitiveness, but still there were comparative advantages in cotton and wheat production. For providing more incentives for food and cash crops, the study recommended that the Sudanese government should provide subsidies for cotton producers in addition to the rehabilitation of the Gezira Scheme infrastructure.

INTRODUCTION

Most tenancies in the Gezira Scheme have become unable to provide an income above the poverty line for an average farmer family in the Gezira. As a result, the Gezira Scheme has become uneconomic from the national as well as from the farmer's viewpoint (Eldaw, 2004).

Attempts to reform agricultural schemes started since the mid-sixties (Elnagarabi, 1996). However, the most significant policy change that has considerable impact on irrigated agriculture is the replacement of the joint account system (JAS) by the individual account system (IAS) in 1980. The idea was to change the role of the government from a partnership in costs and revenues with tenants to that of renting land and selling water to them. It was argued that the IAS gave the tenants incentives to increase productivity and hence increase their income (World Bank, 1986).

The Sudanese government adopted the structural adjustment programs for agriculture (SAPA) since 1992, Gezira Scheme was not an exception; the main specific elements of which were:

1. Reduction of export taxes for agricultural exports to 5% for all exports except cotton and gum Arabic, for which export tax was reduced to 10 %.
2. Removing subsidies on inputs, most important of which are fertilizers, insecticides, land and water.
3. Reducing subsidies on food products prices
4. Lifting price controls and regulations imposed by the government on agricultural commodities; with the exception of wheat, where government intervention was maintained by determining minimum procurement prices.
5. Abolishing the monopoly of public marketing companies.
6. Shifting from public to private finance, provision of credits to agriculture at unsubsidized gross margin rate and adoption of Islamic modes of lending.
7. Privatizing of agricultural engineering, Gezira light railway, ginneries, irrigation, agricultural administration and the civil engineering department into independent companies.
8. Recently, and due to the situation of low productivity and the government desire to apply its privatization program and stop supporting irrigated agriculture, it launched the Gezira Scheme Act in 2005.

The main objective of this paper is to assess the impact of the government policies on cotton and wheat production in the Gezira Scheme. The specific objectives were to estimate the protection, competitiveness and advantage indicators of cotton and wheat.

RESEARCH METHODOLOGY

The data used in the study were obtained from different institutional sources, published and unpublished materials in Gezira Scheme, Sudan Cotton Company, Bank of Sudan, Ministry of Finance and Economic Planning and the General Administration of Customs (seasons 2003-2007).

The policy analysis matrix (PAM) had been used to measure nominal protection coefficient of outputs (NPCO), nominal protection coefficient of inputs (NPCI) effective protection coefficient (EPC), domestic resources coefficient (DRC), international value added (IVA) and profitability coefficient (PC). The PAM parameters would be used to assess the international competitiveness,

protection measures and comparative advantages of the Gezira Scheme products, mainly cotton and wheat.

The policy analysis matrix (PAM)

The policy analysis matrix method has been used as one of the modern tools to analyze the agricultural policies to derive some indicators and standards for measuring the impact of the government agricultural policies on the agricultural sector (Table 1). It has been initiated to analyze market distortions and policy interventions in terms of their effects on the vertical commodity system from its initial production in the farm through the primary procurement, processing and marketing stages (Pearson and Monk, 1989).

Table 1. The policy analysis matrix (PAM) structure**.**

	Revenues	Costs		Profit
		Tradable inputs	Domestic factors	
Private prices	A	B	C	D
Social prices	E	F	G	H
Divergences	I	J	K	L

Source: Pearson and Monk (1989).

Where:
A = total revenue in private price (market prevailing price).
B = cost of tradable inputs in private price.
C = cost of domestic factors in private price.
D = private profit.
E = total revenue in social price (efficiency price).
F = cost of tradable inputs in social prices.
G = cost of domestic factors in social prices.
H = social profits.
The matrix is thus made up of the following identities
Private or financial profit (D) D=A-B-C
Social profit (H) H=E-F-G
International value added (IVA) E-F=H+G
Output transfers (I) I=A-E
Input transfers (J) J=B-F
Factors transfers (K) K=C-G
Net transfers (L) L=D-H=I-J-K

The shadow exchange rate (SER) is the economic price of foreign currency. There is a common misconception that if the market for foreign exchange is a free float, the shadow exchange rate (SER) is equal to the market exchange rate. That would be the case only if there were no taxes and subsidies on the demand and supply of tradable goods, if all commodities and factors were priced at their economic value, and if the current account deficit was sustainable. In all cases, the SER will diverge from the market or official exchange rate (OER).

This method of shadow pricing is tedious and time consuming and consequently rarely followed. Instead, non-traded goods are generally valued at economic prices by the use of conversion factors. A

conversion factor is a short-cut method for converting prices of non- traded goods and services into border prices. At the most aggregated level, a single conversion factor, the standard conversion factor (SCF) is used for this purpose. The SCF is derived by taking the ratio of all exports and imports at border prices to their value at domestic prices. Shadow prices of non-traded items are then obtained by multiplying the (SCF) with the market prices. This reduces the market prices to their real economic value. The formula for the SCF is:

$$SCF = \frac{M + X}{(M + D) + (X - T)} \quad \ldots\ldots (1)$$

Where:

M = value of imports at border prices
X = value of exports at border prices
D = total import duties
T = total export taxes

Based on the collected data, the estimated conversion factor used was 0.94 (Alhag, 2009).

Nominal protection coefficient of outputs (NPCO)

It measures protection and can be calculated by the following formula:

NPCO = A/E…… (2)

Protection coefficient of nominal inputs (NPCI)

It measures the actual divergences or distortions between the domestic prices of tradable inputs and its boarder or world price. It was obtained by dividing the tradable inputs value in private prices (B) by its value in social prices (F)

NPCI = B/F…….…… (3)

Effective protection coefficient (EPC)

It is a comparison between the value-added measured in private prices (A-B) by the value added measured in social prices (E-F), and it is a more efficient measure of the policy effect, so it is assessing the pure impact of the policies on each of the inputs and outputs and it could be measured as

EPC =A-B/E-F…… . (4)

Domestic resources coefficient (DRC)

Also called social cost-benefit ratio and it is used to measure the domestic production efficiency relatively to the world markets. In other words, it measures the economic efficiency or the comparative advantages in the international exchange average and it clarifies the fact that if the social costs and profits to produce a commodity is better than to export it. Also, it compares the social cost of using the domestic factors (G) to the production value added in social prices (E-F), i.e. it measures social domestic resources cost ratio and the comprehensive efficiency of the commodity system as follows:

DRC =G/E-F……. (5)

International value added (IVA)

The IVA is defined as the revenue of the crop minus the imported (tradable) inputs expressed in foreign currency. It is equal to (A-B) in financial analysis and (E-F) in economic analysis. It is an absolute measure of competitiveness. A crop with a positive IVA indicates positive foreign exchange earnings or savings. The principal defect of such a measure is that it neglects the effect of domestic factors.

IVA= E-F…… (6)

Profitability coefficient (PC)

Profitability coefficient is a measure of absolute competitiveness and the incentives of commodity. It is calculated as the ratio of private profitability to social one.

PC=PP/EP=D/H…… (7)

PP = private profitability.

EP = economic profitability.

RESULTS AND DISCUSSION

The policy analysis was employed to calculate the following:

1. The nominal protection coefficient of outputs

The value of nominal protection coefficient of output (NPCO) for cotton in all seasons was less than one which means that cotton output has been taxed, and the government was not protecting cotton production (Table 2). Nominal protection coefficient of outputs (NPCO) for wheat was greater than one, indicating that wheat output had been subsidized (10 SDG per sack) and the government was protecting wheat production. Adam (1996) revealed that cotton was heavily taxed, however, discrimination against cotton appeared to be substantial during the first three years of the program. In the seasons from 2003 to 2007, the discrimination against cotton was still existing despite the slight improvement from an average of 0.28 in the beginning of the liberalization program to 0.77 in the seasons of this study (Table 2). As known earlier, the government reduced export taxes to 5% for all agricultural exports except cotton and gum Arabic, for which export tax was reduced to 10%. According to Albashir (2005), the percentage of taxes and fees on cotton were:

The federal government: 16.5%

Gezira State and social services: 7.8%

(Zakat after subtracting the production cost: 5%)

On the other hand, positive results were achieved in wheat protection that appeared in the increase of NPCO from less than one at an average of 0.30 in the seasons from 1991 to 1993 to an average of 1.09 in the years of the study (Table 3).

Table 2. Nominal protection coefficient of outputs (NPCO) for cotton and wheat in the Gezira Scheme, seasons (2003/04–2006/07).

Season	Cotton	Wheat
2003/04	0.75	1.09
2004/05	0.73	1.08
2005/06	0.79	1.08
2006/07	0.80	1.10

Source: Alhag (2009).

Table 3. Nominal protection coefficient of outputs (NPCO) for cotton and wheat in the Gezira Scheme (seasons 1991/92–1992/93).

Season	Cotton	Wheat
1991/92	0.24	0.45
1992/93	0.31	0.14

Source: Adam (1996).

2. The nominal protection coefficient of inputs

The value of nominal protection coefficient of input (NPCI) for cotton and wheat in all seasons under consideration were greater than one which means that both crops inputs had been taxed (Tables 4 and 5).

Table 4. Nominal protection coefficient of inputs (NPCI) for cotton and wheat in the Gezira Scheme (seasons 2003/04–2006/07).

Season	Cotton	Wheat
2003/04	1.06	1.06
2004/05	1.06	1.06
2005/06	1.06	1.06
2006/07	1.06	1.06

Source: Alhag (2009).

Table 5. Nominal protection coefficient of inputs (NPCI) for cotton and wheat in the Gezira Scheme (seasons 1991-93).

Season	Cotton	Wheat
1991/92	0.77	0.38
1992/93	0.50	0.62

Source: Adam (1996).

In the beginning of the liberalization program, results implied support to farmers through inputs subsidies by the government as shown in Table 5 for both products, whereas in the seasons under consideration, cotton and wheat suffered from high taxation.

3. The effective protection coefficient (EPC)

For cotton, seasons (2003 – 2007), EPC was less than one (Table 6). This means that the adopted policy was discriminating against cotton producers and indicated that the production of cotton was not protected through the policy intervention. For wheat, the value of EPC was greater than one (subsidized) as shown in Table 6. This means that the adopted policy provided positive incentives for producing wheat.

Table 6. Effective protection coefficient (EPC) for cotton and wheat in the Gezira Scheme (seasons 2003/04–2006/07).

Season	Cotton	Wheat
2003/04	0.58	1.09
2004/05	0.58	1.08
2005/06	0.66	1.08
2006/007	0.53	1.11

Source: Alhag (2009).

4. Domestic resources coefficient (DRC)

The results obtained showed that the values of DRC for all seasons under the study for both products were less than one (Tables 7 and 8). This indicates that the Gezira Scheme has a comparative advantage in producing both cotton and wheat and the use of the domestic factors is socially profitable. When comparing these results to those reported by Adam (1996), it is clear that the comparative advantage of cotton is deteriorating (Tables 7 and 8).

Table 7. Domestic resources coefficient (DRC) for cotton and wheat in the Gezira Scheme (2003/04–2006/07).

Season	Cotton	Wheat
2003/2004	0.37	0.33
2004/2005	0.33	0.30
2005/2006	0.30	0.37
2006/2007	0.54	0.24

Source: Alhag (2009).

Table 8. Domestic resources coefficient (DRC**)** for cotton and wheat in the Gezira Scheme seasons (1991/92–1992/93).

Season	Cotton	Wheat
1991/92	0.19	0.36
1992/93	0.26	0.16

Source: Adam (1996).

The comparison indicated that both crops were profitable and competitive, but the difference between the lowest ratio (0.19) in the first season (1991/1992) and the last season (2006/2007) (0.54) indicated a trend of increase in the value of the DRC throughout the years. This was a bad sign which showed that the situation tended to get worse in the comparative advantage of cotton.

5. The international value added (IVA)

It is defined as the revenue of the traded crop minus the imported tradable inputs expressed in foreign currency. A crop with a positive IVA indicated that it is a net earner of foreign exchange. It measures the international competitiveness of the product and is an absolute measure of competitiveness. The results showed positive values of IVA for both products in all seasons analyzed (Tables 9 and 10). These results showed that the production of these products in the Gezira Scheme was competitive and it provided positive foreign exchange earnings, particularly for wheat in the season 2006/2007 as compared to the previous seasons. The results showed positive values of IVA for both crops in both

periods. These results meant that cotton and wheat production in the Gezira Scheme were competitive and provided positive earnings from cotton export and local sale of wheat. However, it appeared that the adopted policies had been in favor of wheat (food crop) which clearly appeared in the season 2006/07 as shown in Tables 9 and 10.

Table 9. International value added (IVA) for cotton and wheat in the Gezira Scheme (seasons 2003/04–2006/07).

Season	Cotton (SD/feddan)	Wheat (SD/feddan)
2003/04	263	205
2004/05	322	257.1
2005/06	343	236.4
2006/07	215.4	423

Source: Alhag (2009).

Table 10. International value added (IVA) for cotton and wheat in the Gezira Scheme (seasons 1991/92–1992/93).

Season	Cotton (SD/feddan)	Wheat (SD/feddan)
1991/92	296.4	133.27
1992/93	291.5	163.96

Source: Adam (1996).

6. The profitability coefficient (PC)

Results obtained for PC indicated that all ratios for cotton were less than one which confirmed that the government discouraged farmers to produce cotton and indicated that they would only receive approximately half of the profit that they would receive in the absence of government policy and that was clearly noticed in the season 2006/07 (Table 11). The ratio for wheat was greater than one in all seasons so that the government provided incentives and favored the production of wheat and the farmer was receiving 0.2% additional profits in all seasons except in the season 2004/05 which was 0.1% as a result of government policy (Table 11).

Table 11. Profitability coefficient (PC**)** for cotton and wheat in the Gezira Scheme (2003/04–2006/07).

Season	Cotton	Wheat
2003/04	0.37	1.19
2004/05	0.39	1.15
2005/06	0.59	1.19
2006/07	0.01	1.2

Source: Alhag (2009).

Conclusions and policy implications

The study was carried out to analyze the impact of the agricultural specific policies adopted by the Sudanese government on the protection, comparative advantage and competitiveness on cotton and wheat production in the Gezira Scheme for the period 2003-07. Results obtained indicated that these policies imposed implicit taxes on cotton and wheat inputs over the years of the study, provided incentives for wheat production, discouraged cotton production and there were still comparative advantages in cotton and wheat production in the Gezira Scheme. The policy implications of the

protection, comparative advantages and competitiveness indicators are that these policies have failed to improve the overall performance of the Gezira Scheme.

REFERENCES

Adam, M.A. 1996. The Policy Impacts on Farmer's Production and Resource Use in the Irrigated Scheme of Gezira, Sudan. Ph. D. Thesis. University of Berlin, Germany.

Al Bashir, A.A. 2005. Economics of cotton in the Gezira Scheme (seasons 2000-2005). M.Sc. Thesis, University of Gezira, Sudan.

Alhag, M.S.M. 2009. Analysis of Government Policies on Cotton and Wheat Production in Gezira Scheme. M.Sc. Thesis, University of Gezira, Sudan.

Eldaw,A.M.2004.Gezira Scheme:Perspectives for Sustainable Develop-ment. German Development Institute, Bonn, retrieved from: www.die-gdi.d.

Elnagarabi, S.E. 1996**.** The Impact of Privatization on the Gezira scheme. M.Sc. Thesis, University of Gezira, Wad Madani, Sudan.

Pearson, R. and Monk. 1989. The Policy Analysis Matrix for Agricultural Development retrieved from:www.stanford.edu.

World Bank.1986. World Development Report Washington DC.

تحليل تأثير السياسات الحكومية على إنتاج القطن والقمح في مشروع الجزيرة(2003-2007)

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الخلاصة

إن الهدف الأساسي لهذه الدراسة هو تحليل تأثير السياسات الزراعية التي اتبعتها الحكومة السودانية على إنتاج القطن والقمح في مشروع الجزيرة خلال المواسم 2003-2007 فيما يختص بالحماية والتنافسية والميزة النسبية. اعتمدت الدراسة على البيانات والمعلومات الثانوية التي تم جمعها من مصادرها الأولية والثانوية التقليدية والالكترونية. تم استخدام مصفوفة تحليل السياسة وهى إحدى أدوات التحليل الكمي لتحقيق هدف الدراسة حيث حسبت أهم مؤشرات تحليل السياسة وهى معامل الحماية الاسمية للمنتجات، معامل الحماية الاسمية للمخرجات، معامل الحماية الفعال، معامل حماية الموارد المحلية، القيمة المضافة، ومعامل الربحية ثم قورنت نتائج الدراسة مع ما توصلت إليه دراسة ادم (1996). خلصت الدراسة إلي أن السياسات الحكومية لا تشجع مزارعي مشروع الجزيرة على إنتاج القطن وان مخرجاته ظلت تعانى من فرض الضرائب طوال مواسم الدراسة بينما تقدم تلك السياسات مجموعة من الحوافز التي تشجع على إنتاج محصول القمح بالمشروع كما أن مدخلات المحصولين مازالت تعانى من فرض ضرائب باهظة ولكن رغم ذلك ما زالت هنالك ميزة نسبية لإنتاج القطن والقمح في مشروع الجزيرة.