



An Economic Analytical Study of Production Policies and their Impact on Sugar Food Security in Egypt

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Abstract: Sugar production in Egypt depends on two main sources, sugar cane and sugar beet, and each of them contributed about 1, 1.27 million tons in 2017, about 44.05% and 55.95% of the total sugar production in the same year. The problem is summarized in the decline in food security from sugar in Egypt. In this context, the research aims to study the production policies of each of the sugar cane and sugar beet crops, and analyze agricultural policies and their impact on achieving food security from sugar during the study period (2005-2018). The policy analysis matrix was relied upon in this. The study reached several results represented in, the annual average of the total production of sugar cane during the study period was about 15927.72 thousand tons. Total production decreased annually at a rate of about 0.61%, the annual average yield of sugar cane was estimated at about 48.92 tons / feddan, and it took a decreasing trend at an annual rate of about 133.3%. The nominal coefficient for the sugar cane crop was estimated at about 1.12, which reflects that the state's policy was in favor of the producers, while the nominal coefficient for the sugar beet crop was about 0.67, which reflects that the state's policy was not in favor of the producers. The coefficient of comparative advantage for each crop of sugar cane and sugar beet was about 0.5 and 0.28, respectively, which indicates that Egypt has a comparative advantage in the production of both crops and its ability to compete in their global markets.

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Introduction:

Sugar is considered one of the strategic commodities in most countries of the world, as it is considered one of the cheap food commodities as a source of energy and it has no alternatives, in addition to the added value that its industry achieves and the labor and investment it absorbs. Therefore, it receives sufficient attention from the countries that produce its raw material and manufactures it, and it is also used in the manufacture of many other food products as an essential factor. For Egypt, sugar is one of the important strategic commodities whose production capacity has failed to keep pace with its consumption energy resulting from the steady increase in the number and income of the population, which has caused a decrease in the rate of self-sufficiency and an increase in dependence on imports, which caused many problems, the most important of which was the provision of foreign exchange.

Egypt's production of sugar depends on two main sources, sugar cane and sugar beet, each of which contributes about 1 million and 1.27 million tons in 2017, equivalent to about 44.05 percent and 55.95% of the total sugar production, which amounts to about 2.27 million tons.

Achieving food security as one of the most important objectives of the Egyptian agricultural economic policy is linked to the development of the agricultural sector as it is responsible for providing agricultural crops and food commodities. The issue of food is also one of the most important strategic issues in which Egypt is concerned, and it is trying hard to increase self-sufficiency rates, reduce the food gap and achieve food security from agricultural and food commodities.

Problem:

The problem of the research is the existence of a nutritional gap in sugar in Egypt, that is, the existence of deficiencies in production with sufficient consumption as a result of an increase in the population on the one hand and an increase in per capita consumption rates on the other hand. Hence, the Egyptian economy is clearly dependent on foreign markets to secure a large part of its nutritional needs of sugar, i.e. the level of food security for sugar in general in Egypt needs an effort, as the current level of self-sufficiency is low. Can the agricultural policy contribute to bridging this gap, especially in light of the challenges that the Egyptian economy is going through and the government's recent tendency to conduct an economic reform program in agreement

with the International Monetary Fund, as the gradual abolition of fuel subsidies, and the liberalization of the exchange rate in November 2016, In addition to the government's tendency to reduce the cultivated areas of the sugar cane crop.

Objective:

The research aims to study the production policies of each of the two crops, sugar cane and sugar beet. By highlighting.

1. The most important economic indicators of the crops at the local level.
2. Getting to know the current situation of crops in Egypt.
3. Assessing the state of food security for diabetes in Egypt during the period (2005-2018) through..
4. Review and analysis of the actual production and consumption of sugar in Egypt.
5. Shed light on the food gap and food deficit of sugar in Egypt and determining the percentages of self-sufficiency and dependence on the outside for each of them.
6. Studying and analyzing exports and imports, and estimating the daily domestic consumption of sugar in Egypt.

The research also aims to study and analyze agricultural policies and their impact on achieving food security from sugar during the study period (2005-2018), where the policy analysis matrix was relied upon.

Method:

The research relied mainly on the use of the descriptive and quantitative analytical method for the data, including the equations of the general time trend in knowing the time development and annual growth rates of the study variables, Indicators of food security for sugar have also been studied in Egypt, through the following equations:

1. Daily domestic consumption = total domestic consumption/365 days.
2. The period of production sufficiency for consumption = total domestic production/total daily domestic consumption.
3. Import coverage period for consumption = the amount of annual imports / total daily domestic consumption.
4. The sum of the two periods = the period of sufficient production for consumption + the period of covering imports for consumption.
5. Amount of surplus in domestic consumption = (The sum of the two periods (the period of production sufficiency for consumption and the period of import coverage for consumption) - 365) * (the daily domestic consumption)
6. Surplus sufficiency period for domestic consumption = the amount of surplus in consumption / daily domestic consumption.

7. The amount of the domestic consumption deficit = {365 - the sum of the two periods (the period of production sufficiency for consumption and the period of import coverage for consumption)} * daily domestic consumption.
8. The period of the consumption deficit = the amount of the deficit in domestic consumption / daily domestic consumption.
9. The size of the strategic stock = {the sum of the two periods (the period of production sufficiency for consumption and the period of import coverage for consumption - 365) * domestic daily consumption} - the amount of exports.
10. The amount of strategic stocks = the amount of surplus in domestic consumption - the amount of deficit in domestic consumption.
11. Food security coefficient = the annual change in the size of the strategic stock / annual domestic consumption. Or the sum of the change in the size of the strategic stock / the average annual domestic consumption. The value of the food security coefficient ranges between zero and one, as the closer it is to zero, the lower the food security and vice versa.

The Policy Analysis Matrix (PAM) method was also relied upon to analyze and draw conclusions. The policy analysis matrix is considered one of the most important modern tools in analyzing agricultural policies and deducing a set of criteria that help in identifying the aspects of agricultural policy in the agricultural sector.

The policy analysis matrix is based on a simple mathematical equation:

Profit = Revenue - Costs

This equation can be rewritten as follows:

$$NSP = e(P_q)Q - e(P_t)I_t - (P_n)I_n$$

Where, (NSP) is the net profit, (e) is the exchange rate the exchange rate of a foreign currency, (P_q) is the product price, (P_t) is the price of tradable inputs, (P_n) is the price of non-tradable inputs (domestic resources), (Q) is the quantity produced, (I_t) is the amount of tradable inputs and (I_n) is the amount of non-tradable inputs (domestic resources).

The agricultural policy analysis matrix depends mainly on the farm budgets of the commodity (sugar crops), which show the costs and the return, including the production costs of the two types of inputs that are tradable and which are traded globally as imports and exports, and non-tradable ones such as land and water And employment, where costs and returns are calculated at market prices (private prices), then at economic prices (shadow prices) and subtracted them to obtain transfers, which reflect the impact of policies, where a set of criteria is estimated by which the effects of these policies are measured.

The policy analysis matrix takes the following table:

Indicators	Returns $R = (P_q)Q$	tradable inputs $\Sigma = e(P_t)I_t$	non-tradable inputs $\Sigma = (P_n)I_n$	Profits
Actual values (market prices, Private Prices)	A	B	C	D
Economic values (shadow prices)	E	F	G	H
Transfers	I	J	K	L

The elements of the policy analysis matrix are used to calculate a set of measures:

1- Nominal Protection Coefficient (NPC)

This criterion is divided into two types:

(a) Nominal Protection Coefficient Of Outputs (NPCO):

It is measured by dividing the return valued at the market price (financial valuation) by the return valued at the shadow price (economic valuation), It reflects price distortions or price deviations between the actual revenue values (market prices) and economic values, that is, it measures the effect of government intervention in the marketing and pricing of sugar crops, It is measured by dividing revenues in actual values (A) by revenues in economic values (E), and if (NPCO > 1) this indicates the existence of a protectionist policy in favor of the producer by supporting the production of the crop, meaning that the local price exceeds the global price represented in the shadow price, if (NPCO < 1), this means that there are taxes on the producers of the crop, while if (NPCO = 1) this means that there is a neutral policy, that is, there is no interference from the government by imposing direct or indirect taxes on the producers, and also that governments do not do any protectionist policy in their favor.

(b) Tradable Inputs Nominal Protection Coefficient (NPCI):

It measures the impact of agricultural policy on producing requirements by determining the amount of support provided by the government to the requirements of crop producing, that is, it measures deviations or distortions between the local prices of tradable inputs and their border prices, It is calculated by dividing the value of tradable inputs at market prices (B) by their value in economic values (F), If the value of (NPCI > 1), this indicates the existence of taxes on producers, meaning that the domestic price of production inputs exceeds their world prices, If (NPCI < 1), this indicates the existence of support for tradable production inputs, while if the value of (NPCI = 1), this reflects the absence of government intervention in the market of tradable inputs, where the purchase prices of these inputs locally are equal to their purchase prices in the global market.

2- Effective Protection Coefficient (EPC):

This coefficient plays the same role as the nominal coefficient of protection, but it is considered

more comprehensive and efficient in calculating the effect of the policy because it refers to the total coefficient of protection as it takes into account both the requirements and the outcomes together, It is used to measure all the effects resulting from the state's intervention, whether through product pricing, subsidizing production inputs, or imposing taxes on producers, that is, it reflects the net effect of the policies followed on the production of sugar crops, and it is measured by dividing the value added at market prices (A - B) by the value added at economic prices (E - F).

3- Domestic Resources Cost Coefficient (DRC):

DRC is used to measure the economic efficiency of local resources and measure the comparative advantage of crop production at the level of the national economy by comparing the opportunity cost of using local resources with the net foreign cash flow generated from the use of these resources, the activities with low cost are more efficient, And the local resource cost coefficient is measured by dividing the cost of non-tradable domestic resources (economically valued), (G), by the product of the difference between the value of production and the value of the producing inputs that have trade, (economically valued), (E - F), If the value of (DRC > 1), this indicates that the opportunity cost of using local resources exceeds their added value, meaning that the government bears higher costs in order to produce the crop locally, and this activity is considered unprofitable, and therefore the government will not have global competitiveness in its producing because it does not have a comparative advantage in its producing, and it would be better to transfer resources from producing this crop to produce other crops with higher producing efficiency, more profit and comparative productive advantage in it that qualifies them to compete in global markets, While if the value of (DRC < 1), this indicates that the cost of using local resources is less than their added value at the border price, which reflects the government's comparative advantage in producing of those crops, and it is better to expand their producing, while if the value of (DRC = 1) This refers to the equilibrium situation, as the government has reached the break-even point and therefore does not achieve gains from producing of these crops.

4- Profitability Coefficient (PC):

The profitability coefficient (PC) is used to measure the impact of the intervention policy on the realized profits. If the value of the criterion is greater than one, this reflects that the producers have benefited from the intervention policy and vice versa, and it is calculated by dividing the value of profits at the market price by the value of profits at the shadow price.

5- Private Cost Ratio (PCR):

The private cost ratio coefficient (PCR) is measured by dividing the cost of local resources (C) by the product (revenues - tradable inputs), (A-B). If the value of the coefficient is less than one, then this indicates that the farmer is making losses, while if the value of the coefficient is greater than one, this indicates that the costs or invested money are less than the added value achieved, that is, the farmer is making a profit.

6- Producer Subsidy Ratio (PSR):

Producer subsidy coefficient (PSR) is measured by dividing ((profit at special prices (market price) minus profit at economic prices (L)) by revenues at economic prices (E). If the value of the coefficient is greater than zero, this indicates that the farmer receives subsidy from the government, while if the value of the coefficient is less than zero, this indicates that the farmer bears implicit taxes.

The economic prices were calculated for each of the producing requirements and outputs in the light of a set of economic concepts. For the production side, the economic values of sugar crops were estimated by estimating the equal price of import by deducting transportation costs and total taxes and fees from the world price assessed in (pounds / ton). As for calculating the economic value of production costs, the following conversion coefficients were used, which were reached by the Agricultural Economics Research Institute in 1998, which are 1.1 for automated work, 1.1 for chemical fertilizer costs, 1.2 for pesticide costs, 1.05 for seed costs, 0.67 for the workers' wages, while the rest of the items remain unchanged.

Data sources:

The research relied mainly on the published data of many agencies, the most important of which are: the Arab Organization for Agricultural Development, the Arab Monetary Fund, the World Bank, The Economic Affairs Sector of the Egyptian Ministry of Agriculture, the Central Agency for Public Mobilization and Egyptian Statistics, the Food and Agriculture Organization of the United Nations (FAO), Also, some published data and statistics from some parties on the international information network were used, in addition to some published studies and researches related to the topic of research.

Research results and discussion:**First: Some economic indicators of sugar production in Egypt during the period (2005-2018).**

• The productive indicators for the most important sugar crops in Egypt during the period (2005-2018).

The productive indicators of sugar cane crop.

1- The evolution of the total production of sugar cane in Egypt.

The data contained in Table (1) in the appendix, which displays the evolution of the total production of sugar cane during the period (2005-2018), indicates that it reached the lowest in 2017 by about 15138.68 thousand tons, while it reached its maximum in 2007 by about 17025.71 thousand tons, with an annual average of about 15927.72 thousand tons, and by estimating the general time trend for the total production of sugar cane, it was found that it decreased annually at a rate of about 0.61%, equivalent to about 97.31 thousand tons, and the statistical significance of this decrease was confirmed at the level of 1%..

2- The evolution of the cultivated area of sugar cane in Egypt.

The data contained in Table (1) in the appendix, which displays the evolution of the cultivated area of sugar cane in Egypt during the period (2005-2018), indicates that it reached the lowest in 2009 by about 317 thousand feddan, while it reached its maximum in 2007 by about 335 thousand feddan, with an annual average of about 325.64 thousand feddan.. The annual growth rate of this area was estimated at about 0.05%, equivalent to about 0.165 thousand feddan, and the statistical significance of this increase was confirmed at the level of 1%..

3- The evolution of the yield of sugar cane in Egypt.

As for the yield of sugar cane in Egypt during the period (2005-2018), it ranged between a minimum of about 47.16 ton/feddan in 2017, and a maximum of about 51.02 ton/feddan in 2006, with an annual average of about 48.92 ton/feddan, and by estimating the general time trend it was found that this yield decreased annually at a rate of about 133.3%, equivalent to about 65.21 ton/feddan, and the statistical significance of this decrease was confirmed at the level of 1%.

4- The evolution of the amount of sugar produced from the sugar cane crop in Egypt.

With regard to the evolution of the amount of sugar produced from sugar cane during the period (2005-2018), it was found that it reached the lowest in 2016 by about 915 thousand tons, while it reached its maximum in 2018 by about 1104 thousand tons, with an annual average of about 1024.19 thousand tons, and the annual growth rate of this amount was

estimated at about 0.88%, but its significance was not confirmed.

Table (1): The evolution of some economic indicators of sugar cane production in Egypt during the period (2005-2018).

Years	Sugar can				Sugar Beet			
	Total production Thousand tons	yield ton/fed.	Area Thousand fed.	Sugar thousand tons	Total production thousand tons	yield Ton/fed.	Area Thousand fed.	Sugar Thousand tons
2005	16308.73	50.806	321	1050	3443.54	20.62	167	460
2006	16682.56	51.017	327	1102	3924.786	21.101	186	499
2007	17025.71	50.823	335	1104	5486.752	22.124	248	548
2008	16505.53	50.943	324	1027	5189.154	20.113	258	484
2009	15502.89	48.905	317	1069	5379.235	20.299	265	543
2010	15843.52	49.511	320	1070	7914.158	20.503	386	750
2011	15757.63	48.485	325	1075	7567.61	20.905	362	755
2012	15579.87	47.791	326	1080	9223.696	21.754	424	900
2013	15801.21	48.028	329	917	10118.62	21.997	460	1083
2014	16063.16	48.383	332	917	11112.7	22.049	504	1096
2015	15901.77	48.481	328	917	12057.93	21.726	555	1150
2016	15430.23	47.332	326	915	11267.2	20.12	560	1210
2017	15138.68	47.161	321	1000	10966.05	20.848	526	1270
2018	15446.57	47.234	328	1104	11108.87	21.63	533	1304
Average	16253.36	48.92	325.64	1024.79	8197.17	21.13	388.14	860.86
Change Rate	-0.6*	-133.3*	0.05*	-0.88	8.42*	0.18	8.4*	8.68*

* Significant at (0.01)

Source: Collected and calculated from Ministry of Agriculture, Economic Affairs Sector, Agricultural Statistics Bulletin, Various issues.

- **The productive indicators of sugar beet crop.**

1- The evolution of the total production of sugar Beet in Egypt.

The data contained in Table (1), which displays the evolution of the total production of sugar beet during the period (2005-2018), indicates that it reached the lowest in 2005 by about 3443.54 thousand tons, while it reached its maximum in 2015 by about 12057.93 thousand tons, with an annual average of about 8197.17 thousand tons, and the annual growth rate of this production was estimated at about 8.42%, equivalent to about 690.43 thousand tons, and the statistical significance of this increase was confirmed at the level of 1%.

2- The evolution of the cultivated area of sugar beet in Egypt.

As for the evolution of the cultivated area of sugar beet in Egypt during the period (2005-2018), it was found that it reached the lowest in 2005 by about 267 thousand feddan, while it reached its maximum in 2016 by about 560 thousand feddan, with an annual average of about 388.14 thousand feddan, and the annual growth rate of this production was estimated at about 8.4%, equivalent to about 32.67 thousand feddan, and the statistical significance of this increase was confirmed at the level of 1%.

3- The evolution of the yield of sugar beet in Egypt.

Table (1) also indicates that the yield of sugar beet in Egypt ranged between a minimum of about 20.11 ton/feddan in 2008, and a maximum of about 22.12 ton/feddan in 2007, with an annual average of about 21.13 ton/feddan, and the annual growth rate of this yield was estimated at about 0.18%, but its significance was not confirmed.

4- The evolution of the amount of sugar produced from the sugar beet crop in Egypt.

With regard to the evolution of the amount of sugar produced from sugar beet during the period (2005-2018), it was found that it reached the lowest in 2005 by about 460 thousand tons, while it reached its maximum in 2018 by about 1304 thousand tons, with an annual average of about 860.86 thousand tons, and the annual growth rate of this yield was estimated at about 8.68%, equivalent to about 74.68 thousand ton, and the statistical significance of this increase was confirmed at the level of 1%.

• **The economic indicators for the most important sugar crops in Egypt during the period (2005-2018).**

- **The economic indicators of sugar cane crop:**

1- The evolution of the farm price of the sugar cane crop in Egypt.

Table (2) shows that the farm price of sugar cane ranged during the study between a minimum of about

160 pounds / ton in 2005, and a maximum of about 735 pounds / ton in 2018, with an annual average of about 368.32 pounds / ton, and by studying the results of estimating the growth equation for the farm price it appears that it increased by about 9.47% annually, equivalent to about 34.87 pounds, and the statistical significance of this increase was confirmed at the level of 1%.

2- The evolution of the total revenue of the sugar cane crop in Egypt.

Table (2) shows that total revenue of sugar cane ranged during the study period from a minimum of about 8129 pounds in 2005, and a maximum of about 34087 pounds in 2018, with an annual average of about 17745.93 pounds, and the annual growth rate of this revenue was estimated at about 11.3%, equivalent to about 2003.34 pounds, and the statistical significance of this increase was confirmed at the level of 1%.

3- The evolution of the variable costs of the sugar cane crop in Egypt.

As for the variable costs per ton of sugar cane, it ranged during the study period between a minimum of about 3022 pounds / ton in 2005 and a maximum of about 8053 pounds / ton in 2018, with an annual average of about 5208.86 pounds / ton, and the annual growth rate of these costs was estimated at about 7.12%, equivalent to about 370.73 pounds, and the statistical significance of this increase was confirmed at the level of 1%.

4- The evolution of the total costs of the sugar cane crop in Egypt.

With regard to the total costs per ton of sugar cane, it ranged during the study period between a minimum of about 4602 pounds / ton in 2005 and a maximum of about 16577 pounds / ton in 2018, with an annual average of about 8093.5 pounds / ton, and the annual growth rate of these costs was estimated at about 10.15%, equivalent to about 821.59 pounds, and the statistical significance of this increase was confirmed at the level of 1%.

5- The evolution of the net return of the sugar cane crop in Egypt.

Table (2) shows that the net return of sugar cane ranged during the study period between a minimum of about 3727 pounds in 2005 and a maximum of about 19377 pounds in 2018, with an annual average of about 9431 pounds, and the annual growth rate of these costs was estimated at about 12.35%, equivalent to about 1164.82 pounds, and the statistical significance of this increase was confirmed at the level of 1%.

6- The evolution of the total margin of the sugar cane crop in Egypt.

As for the total margin, the study showed that it ranged between a minimum of about 5107 pounds in

2005 and a maximum of about 26246 pounds in 2017, with an annual average of about 12537.07 pounds, and the annual growth rate of this margin was estimated at about 13.2%, equivalent to about 1632.61 pounds of the annual average. The statistical significance of this increase was confirmed at the level of 1%.

7- The evolution of the return-cost ratio of the sugar cane crop in Egypt.

The study of the evolution of the return-cost ratio showed that it ranged from a minimum of about 1.73 in 2007 to a maximum of about 3.77 in 2013, with an annual average of about 2.21, and the annual growth rate of this margin was estimated at about 2.1%, equivalent to About 0.05 pounds, and the statistical significance of that increase was confirmed at the level of 1%.

8- The evolution of the pound profitability of the sugar cane crop in Egypt.

For the profitability of the spent pound, it reached its minimum in 2007 by about 0.73 pounds, and its maximum in 2013 by about 2.11 pounds, with an annual average of about 1.16 pounds, and the annual growth rate of the pound profitability is estimated at about 3.6%, equivalent to about 0.04 pounds. The statistical significance of this increase was confirmed at the level of 1%.

9- The evolution of the profitability of a ton of sugar cane crop in Egypt.

With regard to the profitability of a ton, it ranged from a minimum of about 73.36 pounds in 2005 to a maximum of about 410.87 pounds in 2017, with an annual average of about 194.62 pounds. The annual growth rate of the profitability of a ton was estimated at about 12.73%, equivalent to about 24.78 pounds. The statistical significance of this increase was confirmed at the level of 1%.

10- The evolution of the return- variable cost ratio of the sugar cane crop in Egypt.

It was found through a study of the return-variable cost ratio that it ranged between a minimum of about 2.4 in 2007 and a maximum of about 4.45 in 2016. with an annual average of about 3.24 pounds, The annual growth rate of the return- variable cost ratio was estimated at about 4.26%, equivalent to about 0.14, and the statistical significance of that increase was confirmed at the level of 1%.

11- The evolution of the net return- variable cost ratio of the sugar cane crop in Egypt.

For the net return- variable cost ratio of sugar cane, It was found that it ranged from a minimum of about 1.01 in 2007 to a maximum of about 2.51 in 2017, with an annual average of about 1.7. The annual growth rate in the net return rate for variable costs was estimated at 5.71%, including Equivalent to about

0.1, and the statistical significance of that increase was confirmed at the level of 1%.

Table (2): The economic indicators of the sugar cane crop during (2004-2017)

Years	Farm Price	Total Revenue	Variable Cost	Total Cost	Net Return	Total Margin	Return / Cost
2005	160	8129	3022	4302	3727	5107	1.89
2006	170	8673	3087	4412	4261	5586	1.97
2007	182	9250	3856	5348	3902	5394	1.73
2008	200	10189	3981	5640	4549	6208	1.81
2009	234.5	11468	4273	6031	5437	7195	1.9
2010	280	13863	4616	6606	7257	9247	2.1
2011	335	16242	4663	6691	9551	11579	2.43
2012	360	17205	5421	7755	9450	11784	2.22
2013	360	17290	5330	4590	9700	11960	3.77
2014	400	19353	6053	8591	10762	13300	2.25
2015	400	19392	6266	8736	10656	13126	2.22
2016	620	29346	6593	13451	15895	22753	2.18
2017	720	33956	7710	14579	19377	26246	2.33
2018	735	34087	8053	16577	17510	26034	2.16
The average	368.32	17745.93	5208.86	8093.5	9431	12537.07	2.21
The Annual Change	34.87	11.29	7.12	10.15	12.35	13.02	2.08
Annual Change Rate	9.47*	2003.34*	370.73*	821.59*	1164.82*	1632.61*	0.05*

* Significant at (0.01)

Source: Collected and calculated from Ministry of Agriculture, Economic Affairs Sector, Agricultural Statistics Bulletin, Various issues.

Table (2) cont. the economic indicators of the sugar cane crop during the period (2004-2017).

Years	Pound Profitability	Profitability of a Ton	Return / V. Cost	Net Return / V. Cost
2005	0.87	73.36	2.69	1.23
2006	0.97	83.52	2.81	1.38
2007	0.73	76.78	2.4	1.01
2008	0.81	89.3	2.56	1.14
2009	0.9	111.17	2.68	1.27
2010	1.1	146.57	3	1.57
2011	1.43	196.99	3.48	2.05
2012	1.22	197.74	3.17	1.74
2013	2.11	201.97	3.24	1.82
2014	1.25	222.43	3.2	1.78
2015	1.22	219.8	3.09	1.7
2016	1.18	335.82	4.45	2.41
2017	1.33	410.87	4.4	2.51
2018	1.16	358.31	4.23	2.17
The average	1.16	194.62	3.24	1.7
The Annual Change	3.61*	12.73*	4.26*	5.71*
Annual Change Rate	0.04*	24.78*	0.14*	0.1*

* Significant at (0.01)

Source: Collected and calculated from Ministry of Agriculture, Economic Affairs Sector, Agricultural Statistics Bulletin, Various issues.

- **The economic indicators of sugar beet crop:**

- 1- The evolution of the farm price of the sugar beet crop in Egypt.

Table (3) shows that the farm price of sugar beet ranged during the study between a minimum of about 160 pounds / ton in 2005, and a maximum of about 534 pounds / ton in 2017, with an annual average of about 326 pounds / ton, and by studying the results of estimating the growth equation for the farm price it appears that it increased by about 7.68% annually, equivalent to about 25.03 pounds, and the statistical significance of this increase was confirmed at the level of 1%.

- 2- The evolution of the total revenue of the sugar beet crop in Egypt.

Table (3) shows that total revenue of sugar beet ranged during the study period from a minimum of about 3608 pounds in 2006, and a maximum of about

12191 pounds in 2017, with an annual average of about 7581 pounds, and the annual growth rate of this revenue was estimated at about 8.47%, equivalent to about 642 pounds, and the statistical significance of this increase was confirmed at the level of 1%.

- 3- The evolution of the variable costs of the sugar beet crop in Egypt.

As for the variable costs per ton of sugar beet, it ranged during the study period between a minimum of about 1089 pounds / ton in 2005 and a maximum of about 4069 pounds/ton in 2017, with an annual average of about 2369.2

pounds/ton. The annual growth rate of these costs was estimated at about 10.58%, equivalent to about 250.6 pounds, and the statistical significance of this increase was confirmed at the level of 1%.

Table (3): The economic indicators of the sugar beet crop during the period (2004-2017).

Years	Farm Price	Total Revenue	Variable Cost	Total Cost	Net Return	Total Margin	Return / Cost
2005	160	3611	1089	1856	1755	2522	1.95
2006	171	3608	1115	1886	1722	2493	1.91
2007	187.5	4448	1196	1959	2489	3252	2.27
2008	231	4646	1422	2368	2578	3224	1.96
2009	317.22	6927	1555	2697	4230	5372	2.57
2010	263	6054	1787	3003	3051	4267	2.02
2011	355	7886	2079	3457	4429	5807	2.28
2012	363.5	8720	2354	4092	4628	6366	2.13
2013	386.7	9352	2651	4393	4959	6701	2.13
2014	370.07	9039	3012	4869	4170	6027	1.86
2015	378.52	9154	3459	5316	3838	5695	1.72
2016	379.37	8663	3597	6853	1810	5066	1.26
2017	534	12191	4069	7394	4797	8122	1.65
2018	467	11835	3784	6977	4858	8051	1.69
The average	326	7581	2369.21	4080	3522.43	5211.79	1.96
The Annual Change	25.027	642	250.6	456.06	181.31	392.42	0.05
Annual Change Rate	7.68*	8.47*	10.58*	11.18*	5.15*	7.53*	2.3*

* Significant at (0.01)

Source: Collected and calculated from Ministry of Agriculture, Economic Affairs Sector, Agricultural Statistics Bulletin, Various issues.

- 4- The evolution of the total costs of the sugar beet crop in Egypt.

With regard to the total costs per ton of sugar beet, it ranged during the study period between a minimum of about 1856 pounds / ton in 2005 and a maximum of about 7394 pounds / ton in 2017, with an annual average of about 4080 pounds/ton, and the annual growth rate of these costs was estimated at about 11.18%, equivalent to about 456.1 pounds, and the statistical significance of this increase was confirmed at the level of 1%.

- 5- The evolution of the net return of the sugar beet crop in Egypt.

Table (3) shows that the net return of sugar beet ranged during the study period between a minimum of about 1722 pounds in 2006 and a maximum of about 4959 pounds in 2013, with an annual average of about 3522.4 pounds, and the annual growth rate of these costs was estimated at about 5.15%, equivalent to about 181.31 pounds, and the statistical significance of this increase was confirmed at the level of 5%.

6- The evolution of the total margin of the sugar beet crop in Egypt.

As for the total margin, the study showed that it ranged between a minimum of about 2493 pounds in 2006 and a maximum of about 8122 pounds in 2017,

with an annual average of about 5211.79 pounds, and the annual growth rate of this margin was estimated at about 7.5%, equivalent to about 392.4 pounds of the annual average. The statistical significance of this increase was confirmed at the level of 5%.

Table (3) cont.: The economic indicators of the sugar beet crop during the period (2004-2017).

Years	Pound Profitability	Profitability of a Ton	Return / V. Cost	Net Return / V. Cost
2005	0.95	85.11	3.32	1.61
2006	0.91	81.61	3.24	1.54
2007	1.27	112.5	3.72	2.08
2008	1.09	128.18	3.27	1.81
2009	1.57	208.38	4.45	2.72
2010	1.02	148.81	3.39	1.71
2011	1.28	211.86	3.79	2.13
2012	1.13	212.74	3.7	1.97
2013	1.13	225.44	3.53	1.87
2014	0.86	189.12	3	1.38
2015	0.72	176.65	2.65	1.11
2016	0.26	89.96	2.41	0.5
2017	0.65	230.09	3	1.18
2018	0.69	230.1	3.12	1.28
The average	0.97	166.47	3.33	1.64
The Annual Change	0.05	8.33	0.06	0.07
Annual Change Rate	4.9	5	1.86	4.5

* Significant at (0.01)

Source: Collected and calculated from Ministry of Agriculture, Economic Affairs Sector, Agricultural Statistics Bulletin, Various issues.

7- The evolution of the return-cost ratio of the sugar beet crop in Egypt.

The study of the evolution of the return-cost ratio showed that it ranged from a minimum of about 1.26 in 2016 to a maximum of about 2.57 in 2006, with an annual average of about 1.96, and the annual growth rate of this margin was estimated at about 2.3%, equivalent to About 0.05 pounds, and the statistical significance of that increase was confirmed at the level of 1%.

8- The evolution of the pound profitability of the sugar beet crop in Egypt.

For the profitability of the spent pound, it reached its minimum in 2016 by about 0.26 pounds, and its maximum in 2009 by about 1.57 pounds, with an annual average of about 0.97 pounds, and the annual growth rate of the pound profitability is estimated at about 4.86%, equivalent to about 0.05 pounds. The statistical significance of this increase was confirmed at the level of 5%.

9- The evolution of the profitability of a ton of sugar beet crop in Egypt.

With regard to the profitability of a ton, it ranged from a minimum of about 81.16 pounds in 2006 to a maximum of about 230.1 pounds in 2018, with an

annual average of about 166.47 pounds. The annual growth rate of the profitability of a ton was estimated at about 5%, equivalent to about 8.33 pounds. The statistical significance of this increase was confirmed at the level of 5%.

10- The evolution of the return- variable cost ratio of the sugar beet crop in Egypt.

It was found through a study of the return-variable cost ratio that it ranged between a minimum of about 2.4 in 2016 and a maximum of about 4.45 in 2009, with an annual average of about 3.33 pounds, The annual growth rate of the return- variable cost ratio was estimated at about 1.86%, equivalent to about 0.06, and the statistical significance of that increase was confirmed at the level of 5%.

11- The evolution of the net return- variable cost ratio of the sugar beet crop in Egypt.

For the net return- variable cost ratio of sugar beet, it was found that it ranged from a minimum of about 0.5 in 2016 to a maximum of about 2.72 in 2008, with an annual average of about 1.64. The annual growth rate in the net return rate for variable costs was estimated at 4.5%, including Equivalent to about 0.1, and the statistical significance of that increase was confirmed at the level of 5%.

- **A comparative analysis of food security indicators of sugar in Egypt during the two study periods**

Before starting to study and analyze the indicators of food security for sugar in Egypt, it is necessary to differentiate between the apparent and real indicators of the food balance of sugar, as the apparent indicators reflect the apparent gap, which reflects the adequacy of the amount of sugar produced to meet local consumption, regardless of the extent to which this sufficiency is achieved for the actual or real needs of consumers. While the real indicators of the food balance reflect the real gap, which is meant by the adequacy of the quantity produced of sugar, both quantitatively and qualitatively, to meet the actual needs of consumers, and it represents the difference between what an individual gets from sugar (domestic consumption) and its global counterpart or what is recommended by international organizations such as the World Health Organization, which represents The minimum that an individual must obtain in order to carry out his tasks and activities in society.

By comparing consumption based on actual needs with its estimated counterpart without taking needs into account (apparent consumption), we find that we face three possibilities, which are..

- 1- Appropriate consumption (according to international standards) is equal to its apparent counterpart, and this means that there is no real gap, or that the real gap is the apparent gap, and then there is no difference between the apparent indicators and the real indicators of the food balance.
- 2- Appropriate consumption (according to international standards) is greater than apparent consumption, and this means that there is a food deficit, meaning that the real gap is greater than the apparent gap, and that the apparent indicators of the food balance are less than their real counterpart, which negatively affects food security indicators.
- 3- Appropriate consumption (according to international standards) is less than apparent consumption, and this means that there is waste and loss of food, and then the real gap is less than the apparent gap, and that the apparent indicators of the food balance are greater than their real counterpart. In this case, a policy of rationalization of consumption must be applied, which contributes positively to food security indicators.

The real indicators of the food balance will be calculated, and then the indicators of food security for sugar will be estimated by calculating the real consumption based on the global per capita share of sugar during the study period, which is about 22.13

kg, although the maximum amount of added sugars that should be eaten per day for nutrition According to the American Heart Association, which is one of the medical institutions, it is about 37.5 grams for men or 25 grams for women, which is equivalent to approximately 14 kilograms annually.

1- The evolution of the apparent indicators of the food balance of sugar in Egypt.

Table (4) shows that the annual average of the production of sugar during the study period (2005-2018) amounted to about 1811 thousand tons, while the annual average gap of the sugar food was about 902.14 thousand tons, and therefore the annual average of the ratio of self-sufficiency is about 66.5%, as for the quantity of sugar imports, its annual average during the study period was estimated at about 1051.82 thousand tons.

As for the average per capita share of sugar, it calculated at about 33.14 kg annually during the study period, and the annual average of the production coverage period for sugar consumption amounted to about 243 days during the mentioned period. While the annual average of the imports coverage period for sugar consumption, which reflects the percentage of dependence on the outside in providing sugar, amounted to about 38.12 days during the period (2005-2018).

Therefore, it is clear from the previous comparative analysis of the indicators of the food balance during the study period that all indicators are positive, and the increase in both imports and dependence on the outside in providing sugar, despite the improvement of production and the high percentage of production coverage for consumption, which reflects the government's tendency in some years of the last period of the study to export sugar This caused, in some years, an increase in sugar prices, which led the government to take decisions to ban the export of sugar.

2- The evolution of real indicators of the food balance of sugar in Egypt.

It was also found from the study of the indicators of table (4) that the annual average per capita share of sugar globally was estimated at about 22.12 kg, and then the annual average of consumption needs for the same period, in light of the global average per capita share, was estimated at about 1820.4 thousand tons, and the annual average of the food gap was estimated at about 9.24 thousand tons. And the self-sufficiency rate reached 99.24% during the same period.

And by studying the production coverage period for sugar consumption needs, it was found that its annual average reached about 362.3 days, and annual average of the imports coverage period for sugar consumption needs was about 56.64 days during the study period.

Table (4): The evolution of the apparent indicators of the food balance of sugar during the period (2004-2017)

Years	Production	Consumption	imports	Food Gap	Ratio of Self-Sufficiency	per capita share	production coverage period	The ratio of dependence on abroad
2005	1365	2255	354.83	-890	60.53	31.91	220.94	15.74
2006	1510	2485	826.58	-975	60.76	34.51	221.79	33.26
2007	1601	2441	630.81	-840	65.59	33.15	239.4	25.84
2008	1652	2598	975.37	-946	63.59	34.55	232.09	37.54
2009	1511	2690	790.81	-1179	56.17	34.97	205.02	29.4
2010	1612	2748	1161.49	-1136	58.66	34.92	214.11	42.27
2011	1820	2629	994.6	-809	69.23	32.65	252.68	37.83
2012	1830	2800	1074.54	-970	65.36	33.92	238.55	38.38
2013	1980	2850	1144.35	-870	69.47	33.68	253.58	40.15
2014	2000	2840	1050.32	-840	70.42	32.72	257.04	36.98
2015	2013	2870	1304	-857	70.14	32.26	256.01	45.44
2016	2067	2900	1380	-833	71.28	31.86	260.16	47.59
2017	2125	2930	1460	-805	72.53	31.81	264.72	49.83
2018	2270	2950	1577.8	-680	76.95	31.05	280.86	53.48
The average	1811.14	2713.29	1051.82	-902.14	66.48	33.14	242.64	38.12

Source: Collected and calculated from Ministry of Agriculture, Economic Affairs Sector, Bulletin of Food Balance Sheet, Various issues.

Table (4) cont.: The evolution of the real indicators of the food balance of sugar during the period (2004-2017)

Years	per capita globally	actual needs	Food Gap	Ratio of Self-Sufficiency	production coverage period	The ratio of dependence on abroad
2005	21.00	1484.07	-119.07	91.98	335.72	23.91
2006	21.50	1548.22	-38.22	97.53	355.99	53.39
2007	21.30	1568.53	32.47	102.07	372.56	40.22
2008	22.00	1654.18	-2.18	99.87	364.52	58.96
2009	21.90	1684.77	-173.77	89.69	327.35	46.94
2010	21.70	1707.57	-95.57	94.40	344.57	68.02
2011	21.70	1747.50	72.50	104.15	380.14	56.92
2012	22.10	1824.36	5.64	100.31	366.13	58.90
2013	22.40	1895.71	84.29	104.45	381.23	60.37
2014	22.40	1944.54	55.46	102.85	375.41	54.01
2015	22.80	2028.29	-15.29	99.25	362.25	64.29
2016	22.80	2075.26	-8.26	99.60	363.55	66.50
2017	23.10	2127.97	-2.97	99.86	364.49	68.61
2018	23.10	2194.50	75.50	103.44	377.56	71.90
The average	22.13	1820.39	-9.25	99.25	362.25	56.64

Source: Collected and calculated from Ministry of Agriculture, Economic Affairs Sector, Bulletin of Food Balance Sheet, Various issues.

It is clear from the previous comparative analysis of the real food balance indicators that rationalizing the consumption of sugar to equal the average per capita share globally would reduce the quantities consumed from sugar and then reduce its imports, and what this represents in reducing the burden on the trade balance, which is witnessing a permanent deficit, or re-exporting those quantities and improving this deficit.

- **Analysis of the impact of the agricultural policy on the production of the most important sugar crops using the policy analysis matrix**

1- Analysis of the impact of the agricultural policies on the production of sugar cane

The results of the policy analysis matrix for the sugar cane crop shown in Table (5) indicate that the total achieved financial revenues was estimated at 31620 pounds/feddan, while the economic revenues

valued at border (shadow) prices was estimated at 28141.8 pounds. Then, the financial profits (at the market price) obtained by the sugar cane producer were estimated at about 16757.94 pounds, while the economic profits (at the shadow price) were estimated at 16836.36 pounds. The net effect of agricultural policies during the study period was about 78.42, which represents the difference between the actual profits and the economic profits.

Table (5) also indicates that the financial cost of productive resources was estimated at 4457.76 pounds, while the economic cost was estimated at 4502.33 pounds, meaning that the cost of tradable inputs in the market is less than their economic cost, which indicates support for inputs. Hence, it can be said that the policies followed during the study period were in favor of the producers, as the government provided subsidies for those requirements estimated at 44.57 pounds.

Table (5): Results of the policy matrix estimation of sugar cane and sugar beet crops in Egypt

evaluation type	sugar cane				sugar cane			
	revenues	Inputs cost		profits	revenues	Inputs cost		profits
		Tradable	Non-tradable			Tradable	Non-tradable	
Financial evaluation (market prices)	31620	4457.76	10420.21	16757.94	13951.6	1625.51	5850.57	6520.04
Economic evaluation (Shadow price)	28141.8	4502.33	11708.1	16836.36	20684.3	1950.6	5256.51	13757.28
Transfers (Impact of policies)	3478.2	44.57	1287.89	78.42	6732.8	325.09	594.06	7237.24

Source: collected and calculated from Ministry of Agriculture, Economic Affairs Sector, Bulletin of Food Balance Sheet, Various issues.

- **Indicators of the policy analysis of the sugar cane crop**

1- Nominal Protection Coefficient of Finished Products (NPCO).

The indicators of Table (7) show that there is a great difference between the local price and its global counterpart for the cane crop during the study period, as the nominal coefficient of the products was estimated at about 1.12, which indicates that the government's policy was in favor of the producers, which is confirmed by the increase in the value of this coefficient over one, meaning that Domestic prices of cane are higher than their international counterparts.

2- Nominal Protection Coefficient of Inputs (NPCI)

NPCI reflects the impact of the agricultural policy on the prices of inputs, through the ratio of support provided by the government for these inputs, as the results of Table (7) show that the nominal protection coefficient for inputs was estimated at about 0.99, which means a decrease in the support rate provided by the government for sugar cane production requirements. Which in turn explains the closeness of

the prices of production inputs locally with their global counterpart, which means that the government's policies regarding production requirements may approach neutrality, or that they are somewhat unfavorable to producers.

3- Effective Protection Coefficient (EPC)

Table No. (7) shows that the value of the effective protection coefficient was estimated at about 1.15, which indicates that the actual value added to the production of the cane crop is greater than its economic value. This may be attributed to that the actual prices are higher than the economic prices and because producers obtain support for production inputs, even if the percentage of this support for imported crops decreases, and that the net effect of local policy on both production markets and production inputs markets was in favor of producers.

4- Coefficient of Comparative Advantage or Domestic Resource Cost Coefficient (DRC).

By studying the impact of agricultural policy on the comparative advantage of the cane crop, it was found that the coefficient of comparative advantage

(the coefficient of the cost of local resources) was estimated at about 0.5, which indicates that Egypt has a comparative advantage in producing the sugarcane crop, and it has the ability to compete in the global markets, and that producing the crop locally is better than importing it from abroad.

5- Profitability Coefficient (DRC)

It is clear from Table (7) that the profitability coefficient was estimated at about 1.02, which means that the sugar cane producers have benefited from the procedures and policies that took place in the base period, and they got net support unlike the comparison period.

6- Special Cost Ratio (PCR)

Table (7) indicates that the coefficient of the special costs ratio was estimated at about 0.38, which is less than one, which means that the net value added of the invested funds was less than the production costs, and therefore the investment in producing sugar cane did not achieve profitable profits.

7- Production Subsidy Rate (PSR)

Production Subsidy Rate was estimated at about 0.003, which means that sugarcane producers have benefited from the procedures and policies that took place in the base period and that they obtained support unlike the comparison period.

Table (6): The financial and economic values of the producing cost items of sugar cane and sugar beet crops in Egypt.

cost items	Sugar cane		Sugar beet	
	Financial evaluation	Economic evaluation	Financial evaluation	Economic evaluation
Seed value	447,86	263.4	690.2	724.7
Manure value	40.0	29.2	22.1	22.1
value of chemical fertilizer	1295,07	855.2	2409.6	2650.5
pesticide value	399,71	288.0	20.4	24.5
Other expenses	547.0	322.0	1301.6	1301.6
Total value of production inputs	2729.6	1757.8	4443.9	4723.5
Second: local resources				
Human labor wages	1886.9	1264.2	3122.3	2091.9
Automated labor wages	848.3	933.1	2092.7	2301,99
animal labor wages	0.0	0.0	1.0	1.0
total wages	2735.2	2197.3	5216.0	4394.9
Total costs without rent	4354.7	3955.1	9659.9	9118.4
rent	3075.4	3075.4	5161.0	5161.0
Total costs	7430.1	7030.5	14820.9	14279.4
yield	42.1		98.3	
farm price	607.8		650.2	

Source: collected and calculated from Ministry of Agriculture, Economic Affairs Sector, Bulletin of Food Balance Sheet, Various issues.

Table (7): The indicators of the policy analysis of sugar cane and sugar beet crops in Egypt.

Indicator	How to calculate	Sugar cane	Sugar beet
actual profits	(A - B - C)	16742.0	6475.5
Economic profits (shadow price)	(E - F - G)	11931.4	13477.2
Production transfers (the impact of policy on production)	(A - E)	-3478.2	6732.8
Tradable input transfers	(B - F)	44.6	325.1
Transfers of non-tradable inputs	(C - G)	-1287.9	594.1
Net transfers (net effect of the policy)	(D - H)	-78.4	7237.2
Nominal Protection Factor (NPCO)	(A ÷ E)	1.1	0,67
Input Nominal Protection Coefficient (NPCI)	(B ÷ F)	1.0	0,83
Effective Protection Factor (EPC)	(A - B) ÷ (E - F)	1.2	0,65
Coefficient of Comparative Advantage	(G) ÷ (E - F)	0.5	0,28
Profitability coefficient	(D) ÷ (H)	1.0	0,47
Private Cost Ratio (PCR)	(C) ÷ (A - B)	0.4	0,47
Production Subsidy Rate (PSR)	(L) ÷ (E)	0.0	0,35

Source: collected and calculated from Ministry of Agriculture, Economic Affairs Sector, Bulletin of Food Balance Sheet, Various issues.

1- Analysis of the impact of agricultural policies on the production of sugar beet

The results of the policy analysis matrix for the sugar beet crop shown in Table (7) indicate that the total achieved financial revenues was estimated at 13951 pounds/feddan, while the economic revenues valued at border (shadow) prices was estimated at 20684 pounds. Then, the financial profits (at the market price) obtained by the sugar beet producer were estimated at about 6520 pounds, while the economic profits (at the shadow price) were estimated at 13757 pounds. The net effect of agricultural policies during the study period was about 7237.

Table (7) also indicates that the financial cost of productive resources was estimated at 1625.5 pounds, while the economic cost was estimated at 1950.6 pounds, meaning that the cost of tradable inputs in the market is less than their economic cost, which indicates support for inputs. Hence, it can be said that the policies followed during the study period were in favor of the producers with regard to the tradable inputs.

- **Indicators of the policy analysis of the sugar beet crop**

1- Nominal Protection Coefficient of Finished Products (NPCO).

The indicators of Table (7) show that there is a great difference between the local price and its global counterpart for the cane crop during the study period, as the nominal coefficient of the products was estimated at about 0.67, which indicates that the government's policy was not in favor of the producers, due to the lower value of this coefficient than one, meaning that the local prices of sugar beet are less than their global counterpart, and then the producers of the beet crop bear implicit taxes, which means that the government tends to limit the cultivation of sugar beet.

2- Nominal Protection Coefficient of Inputs (NPCI)

NPCI reflects the impact of the agricultural policy on the prices of inputs, through the ratio of support provided by the government for these inputs, as the results of Table (7) show that the nominal protection coefficient for inputs was estimated at about 0.83, meaning that the rate of subsidy provided by the government for sugar beet production requirements was about 17% of the world price of these requirements, which is a fairly low percentage, which means that the value of production requirements locally is close to its global counterpart.

3- Effective Protection Coefficient (EPC)

Table No. (7) shows that the value of the effective protection coefficient was estimated at about 0.65, which indicates that the actual value added to the production of the cane crop is less than its economic value. This may be attributed to lower

actual prices than economic prices, producers bear taxes on production inputs for this crop that are imported, and that the net effect of local policy on both production markets and production inputs markets was not in favor of producers. Nevertheless, it must be noted that the value of the effective protection coefficient in comparison with its counterpart in the base period, which reflects and confirms the government's orientation and policy with regard to sugar beet.

4- Coefficient of Comparative Advantage or Domestic Resource Cost Coefficient (DRC).

By studying the impact of agricultural policy on the comparative advantage of the cane crop, it was found that the coefficient of comparative advantage (the coefficient of the cost of local resources) was estimated at about 0.28, which indicates that Egypt has a comparative advantage in producing the sugar beet crop, and it has the ability to compete in the global markets, and that producing the crop locally is better than importing it from abroad. It is also clear that Egypt has a comparative advantage in the comparison period due to the low value of the coefficient of comparative advantage, as the results indicate that it takes about 0.28 units of local resources to generate a unit of foreign exchange.

5- Profitability Coefficient (DRC)

It is clear from the indicators of Table (7) that the profitability coefficient was estimated at about 0.47, which means that the sugar beet producers borne implicit taxes.

6- Special Cost Ratio (PCR)

Table (7) indicates that the coefficient of the special costs ratio was estimated at about 0.47, which is less than one, which means that the net value added of the invested funds was less than the production costs, and therefore the investment in producing sugar beet achieved profitable profits.

7- Production Subsidy Rate (PSR)

Production Subsidy Rate was estimated at about 0.35, which means that sugar beet producers have received support from the government.

The most important recommendations

1. Expansion of sugar beet cultivation, especially in light of the limited water resources.
2. Rationalizing domestic consumption by reducing the average per capita share by educating citizens.
3. Activating the state's supervisory role on the production inputs market to reduce costs and then increase returns.
4. The need to work on setting policies that would converge between border and farm prices, especially for the sugar beet crop

Summary:

Sugar is one of the important strategic commodities in Egypt, whose production capacity was unable to keep up with the increase in its consumption capacity resulting from the steady increase in the number of the population, which resulted in a decrease in the self-sufficiency rate and an increase in dependence on imports, which caused many problems, the most important of which is the provision of foreign exchange,

Sugar production in Egypt depends on two main sources, sugar cane and sugar beet, and each of them contributed about 1, 1.27 million tons in 2017, about 44.05% and 55.95% of the total sugar production in the same year, which amounted to about 2.27 million tons.

The problem is summarized in the decline in food security from sugar in Egypt. In this context, the research aims to study the production policies of each of the sugar cane and sugar beet crops, and analyze agricultural policies and their impact on achieving food security from sugar during the study period (2005-2018). The policy analysis matrix was relied upon in this. The study reached several results, including:

- 1 - The annual average of the total production of sugar cane during the study period was about 15927.72 thousand tons. Total production decreased annually at a growth rate of about 0.61%, equivalent to about 97.318 thousand tons, and the annual average yield of sugar cane during the study period was estimated at about 48.92 tons / feddan, and it took a decreasing trend at an annual rate of about 133.3% of the annual average, estimated at about 65.21 tons / feddan.
- 2 - The nominal coefficient for the sugar cane crop was estimated at about 1.12, which reflects that the state's policy was in favor of the producers, while the value of the nominal coefficient for the sugar beet crop was about 0.67, which reflects that the state's policy was not in favor of the producers.
- 3 - The coefficient of comparative advantage for each crop of sugar cane and sugar beet was about 0.5 and 0.28, respectively, which indicates that

Egypt has a comparative advantage in the production of both crops and its ability to compete in their global markets.

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