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Economic Potentialities Achieve Self-Sufficiency from Egyptian Sugar under the International Variables

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Abstract: Sugar is one of the strategic goods. Sugar production in Egypt and the world depends on the crops of sugarcane and sugar beet, which contribute about 61.2%, 38.8%, respectively of the total sugar produced locally estimated at 1.757 million tons in 2007, nearly covering 67.5% of domestic consumption. Egypt depends on Brazil to fulfill its needs of sugar; as the sugar imported by Egypt from Brazil represents about 79.8% of total Egyptian imports that reached approximately 1.475 million tons in the period (2004-2007). This situation holds a serious risk since Brazil's tendency to the produce bio-ethanol from sugar cane. Results showed that production of sugar from sugar beet is more efficient than production of sugar from sugarcane in the light of the limited available land and water resources despite the drop in farm price and net revenue of the sugar beet crop compared to the sugarcane crop. The main axes to improve rates of self-sufficiency of sugar are represented in the two main axes; first to increase the volume of supply of sugar and the second deals with the rationalization of its consumption. The increase of the supply of sugar needs to increase the production of its basic sources which are the sugar beets and sugarcane and this can be done by maintaining the area of sugarcane and increasing the area of sugar beets, as well as increasing their productivity. The third alternative is considered the best one to reach 94.24%, 113.08% in 2012 and 2017, respectively. This alternative depends on the horizontal expansion of the area of sugar beet, especially in the new lands, with keeping the sugarcane area at 326.9 thousand feddans. Moreover, the feddan productivity needed to be developed in each of the sugarcane and sugar beet, this can be achieved through farmers adoption of the modern technologies and modernization of manufacturing processes used in the production of sugar, beside the possibility of rationalization of sugar consumption by reducing the average per capita intake to what it was in 2003. The study recommends the necessity to set a pricing policy of the sugar crops to achieve the objective of the agricultural policy. The study also recommends the necessity to increase investments directed to the sugar industry to open new production lines in the sugarcane factories and establishment of new factories to produce beet sugar in the areas where sugar beet is widely grown.

Key words: Sugarcane · Sugar beet · Self-sufficiency of sugar in Egypt

INTRODUCTION

The achievement of self-sufficiency is considered an important national objective for its close relation with political, social and economic aspects under the present international variables and conventions. From the consumption point of view sugar comes after wheat as an essential and strategic commodity. Sugar is produced in Egypt from sugarcane (61.2%) and, sugar beet (38.8%) of the total local production which was about 1.757 million tons in the year 2007 covering about 67.6% of the domestic consumption. In Egypt sugarcane is considered the first source for sugar production, molasses and sugar cane juice the popular beverage beside other uses, while sugar beet is the second source for sugar production. Its residues are processed and used in cultivation, animal feeding beside other several secondary industries.

Sugarcane cultivation consumes plenty of irrigation water, about 12400m^3/feddan. That is why the expansion in sugar industry in Egypt depends now on the expansion in the cultivation of sugar beet which becomes about 249 thousand feddans i.e. about 3/4 the area of sugarcane.

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Research Problem: The increasing world demand for food products specially sugar led to an increase in the international prices of sugar specially the sugar crops are getting used now in the production of ethanol as an alternative or additional source for energy beside petroleum. This direction is more pronounced in Brazil and France; two of the largest producers and exporters of sugar. The expected increase of ethanol production in these countries will lead to a consequent decrease in sugar production and a decrease in its global supply by about 15%[6] which will increase its world price. This may cause troubles in the developing countries including Egypt which import sugar.

The Aim of the Research Subject: This research subject aims at introducing a strategy to improve the degree of self sufficiency of sugar either through developing the national production of sugar crops beside working with full capacity of the sugar factories, or rationalization of the domestic consumption of sugar.

The Plan and Sources of the Subject: This research subject depends mainly on the secondary data published and unpublished through the period (1972-2007) from the ministry of agriculture and land reclamation, the central agency for public mobilization and statistics and the American agricultural agency. The analytical methods for descriptive statistics and analysis-simple regression- were used to achieve and discuss the conclusions according to the logical economy.

The Present Situation of Production and Consumption of Sugar in the World: Table 1 showed that the most important countries producing sugar are Brazil, India, the European Union and China in the ratios 19.87%, 14.87%, 12.4% and 7.64%, respectively from the world production which was about 153.78 million ton in the period (2005-2007). The production of U.S.A, Thailand, Mexico and Egypt in the same period was about 4.91%, 3.61%, 3.55% and 1.05%, respectively. India, the European Union, China and Brazil are considered from the most important consuming countries for sugar by % ratios of about 13.82, 13.38, 8.23 and 7.42, respectively from the total world consumption which was about 145.82 million tons in the period (2005-2007), beside U.S.A, Russia and Egypt with % respective ratios of about 6.3, 4.08 and 1.68. The mean consumption of sugar per capita per year was about 51.8 kg in Brazil (upper limit) and about 6.7 kg in China (lower limit) while the mean international value was about 25 kg in the period of study.

The Present Situation for the World Foreign Trade of Sugar: Brazil is considered the most important exporting country for sugar due to its enormous production and low consumption of it. It exports about 41.1% of the total world exports which amounts about 47.52 million ton as a mean value in the period (2005-2007), in addition to Thailand, Australia and the European Union with relative % ratios of about 9.68%, 8.54% and 7.92%, respectively. While the most important importing countries for sugar and the European Union, Russia, United State and Egypt Egypt and China with respective % ratios of about 8.2%, 8.2%, 4.98%, 3.88% and 2.69% of the total sugar world imports which amounts about 42.36 million ton as a mean value in the study period (Table 2).

Progress of Self-Sufficiency of Sugar in Egypt: Table 3 showed that the gap between production and consumption of sugar in Egypt started after the war 1973 at the beginning of the opening economic policy and the subsequent change in the food patterns and the exceeding rate of sugar consumption per capita. This gap has increased significantly at the beginning of eighties. It was about 573 thousand tons in 1981 and still increased to reach a maximum of about 978 thousand tons in 2006 which costs about 196 million dollars. The relative self-sufficiency was at its lowest level in the year 1981, it was about 51.7%. It started improvement in the year 1982 by introducing sugar beet cultivation, application of economic liberalization policy and linking the domestic prices by the world prices where it reached a maximum of about 77.8% in the year 2001. Declination occurred in the recent years due to the increase in sugar consumption per capita to reach about 67.5% in the year 2007.

International Markets for Egyptian Imports of Sugar: Table 4 showed the geographical distribution of the Egyptian imports of sugar during the period (2004-2007). It shows the monopoly of Brazil for the Egyptian import market of sugar which arrived at about 79.8% from the total sugar imports, i.e. about 1.475 million tons in average in the period (2004-2007). This reflects the risk extent in the dependence on one market as a source for imports of a strategic commodity such as sugar. This problem became more pronounced now after the new direction in Brazil and several sugar producing countries to produce ethanol from the sugar crops which can be used to compensate the expected shortage in petroleum and other natural fuel sources and to overcome any political problems which may arise from the prices or supply of natural fuels. Ireland is considered the second market for

Table 1: The important producing and consuming sugar countries as a mean in the period (2005-2007), the amount in million tons and the share per capita in kg /year

Producing Countries			Consuming Countries			
Country	Amount	%	Country	Amount	%	Mean share/capita
Brazil	30.55	19.87	India	20.15	13.82	16.30
India	22.87	14.87	European Union	19.51	13.38	38.40
European Union	19.07	12.40	China	12.00	8.23	6.70
China	11.75	7.64	Brazil	10.83	7.42	51.80
United states	7.54	4.91	United states	9.19	6.30	32.60
Thailand	5.55	3.61	Russia	5.95	4.08	36.00
Mexico	5.46	3.55	Egypt	2.45	1.68	32.50
Egypt	1.62	1.05				
The World	153.78	100	The World	145.82	100	25

Reference: Collected and computed from the site FAS of American agricultural agency

Table 2: The important exporting and importing sugar countries as a mean in the period (2005-2007) in million tons

Exporting Countries			Importing Countries		
Country	Amount (million ton)	%	Country	Amount (million ton)	%
Brazil	19.53	41.1	European Union	3.48	8.2
Thailand	4.6	9.68	Russia	3.48	8.2
Australia	4.06	8.54	Indonesia	2.11	4.98
European Union	2.77	7.92	United State	1.64	3.88
			Egypt	1.14	2.69
The World	47.52	100	The World	42.36	100

Reference: Collected and computed from the site FAS of American agricultural agency

Table 3: Progress of the ratio of self-sufficiency of sugar in Egypt in the period (1972-2007)

The statement	1972	1981	1995	2001	2006	2007
The statement	1972	1981	1995	2001	2006	2007
Population(million)	30.18	43.5	60.3	66.9	75.1	76.5
Sugar Production(1000ton)	593	614.5	1131	1405	1575	1757
Sugar Consumption(1000ton)	501	1187.5	1586.3	1806	2553	2601
Rate of consumption/capita (kg/y)	16.6	27.3	26.3	27	34	34
Sugar gap(1000ton)	92	-573	-455.3	-401	-978	-844
% self-sufficiency	118	51.7	71.3	77.8	61.7	67.5

Reference: Collected and computed from:

1-Ministry of agriculture and land reclamation: "sugar crops and sugar production in Egypt", annual report of sugar crops council, (2007).

2-The Central Agency for Public Mobilization and Statistics, Trade and consumption news (different issues).

Table 4: Geographical distribution for the Egyptian imports of sugar as a mean in the period (2004-2007). (The quantity in 1000ton, value: (million L.E)

	Cane sugar imports		Beet sugar imports		Total sugar imports		
Country	Quantity	Value	Quantity	Value	Quantity	%	Value
Brazil	974.7	1669	201.3	304.3	1176	79.7	1973.3
Ireland	99	129	0.12	0.17	99.12	6.7	129.17
European Union	23.9	20.2	46.6	72.6	70.5	4.8	92.8
Argentina	36.2	48.7	1.02	1.52	37.22	2.5	50.22
China	34.9	35.7	0.45	0.91	35.35	2.4	36.61
Guatemala	27	40.1	-	-	27	1.8	40.1
Other countries*	24.3	42.3	5.51	6	29.81	2.1	48.3
Total	1220	1985	255	385.5	1475	100	2370.5

•Including U.S., Aurogway, kingdom of Arabia

•Reference: Collected and computed from: The Central Agency for Public Mobilization and Statistics, information, unpublished information

Table 5: Quantity of ethanol production in million gallons and the used crop in the important exporting sugar countries for Egypt and the international pure white sugar in the period (2004-2007)

Country	2004	2005	2006	2007	2008	The used crop
Country	2004	2005	2006	2007	2008	The used crop
Brazil	3874	4245	4710	5958	6896	Sugarcane
India	326	291	436	647	608	Sugarcane
France	219	240	238	304	396	Sugar beet-maize
South Africa	102	107	108	107	108	Sugarcane-maize
Thailand	65	82	101	105	149	Sugarcane-rice
The World Total	10746	11712	13590	16942	20369	-
International Sugar price*	145	293	424	332	(**)	-

*International pure sugar price (dollar/ton)

** Unavailable information

Reference: Collected and computed from:

1-Mona Ahmed Selim(Dr): " An Economic study for the Impact of Biofuels production on The Grain Prices", 16 th Conference of Economic Agriculture, Egyptian Association of Agricultural Economics, 15-16Oct. 2008.

2-Ministry of agriculture and land reclamation: " sugar crops and sugar production in Egypt", annual repot of sugar crops council,(2007).

the imports of cane sugar in a ratio 8.1%, followed by Argentina and China markets with ratios 2.97% and 2.86%, respectively. While for beet sugar, the European Union markets come after Brazil by a ratio of about 18.27%, from the total imports of beet sugar in Egypt.

The Development of Ethanol Production in the Most Important Countries Producing and Exporting Sugar: Table 5 showed that Brazil is the first country in the world producing bio-ethanol from sugar crops. It depends mainly on sugarcane. The volume of its production was about 6896 million gallons in 2008 by an increase of about 78% than that in 2004. India the second country in producing ethanol from sugarcane. Its production was about 608 million gallons in 2008 by an increase of about 86.5% than that in 2004. France is the third country in this field by a production volume of about 396 million gallons from sugar beet, wheat and maize to a little extent. While Thailand and South Africa depend mainly on sugarcane to produce bio-ethanol. The table showed also a continuous change and strong fluctuations in the international prices of sugar. These prices were affected recently by the amounts of sugar crops which were directed to produce ethanol.

The increase in ethanol production from sugarcane and sugar beet by a million gallons increases the sugar price by 7.2 Dollars. This means that an increase in ethanol production by 10% in Brazil, India and France increase the international sugar price by 5.33% at the same conditions of measurement. It is expected that by increase in the production of biofuels, the global food prices must increase.

Domestic Sugar Production and its Determinants: Sugar production in Egypt depends on two main crops: sugarcane and sugar beet, beside several factors affecting these sources and the production processes.

Firstly: Domestic Production from Sugarcane and its Determinants": Sugar production in Egypt depends mainly on sugarcane crop which provides about 66.1% of the total sugar production in the period (2005-2007). Sugarcane cultivation in Egypt is concentrated in El-Minya, Sohag, Quena and Aswan governorates which represent about 97.1% of the total area of sugarcane, with a productivity of about 51.45 ton/ feddan in average. While Luxor city performed the highest productivity 53.04% of this crop[7].

In spite of constructing 8 factories for production of cane sugar in these governorates designed with a capacity reaches about 10.1 million tons of cane, their working efficiency was in the range of 92% to 98% in the period (2004-2007), which indicates the presence of a devoid production capacity in these factories due to fluctuations of the supplied amounts.

Determination of Cane Sugar Production: The cultivated area, the productivity and the price/ton are the important determinants for sugar production. Table (6) showed that it has increased to about 245.7 thousand feddan in 2007 by an increasing ratio of about 30.9% relative to that in the year 1982 which was about 187.7 thousand feddan. The supplied area was about 74.8%and 75.2% from the cultivated area in the years 1982 and 2007, respectively. While the development of the mean productivity per

Table 6: Development of some technical and economic indicators for sugarcane in the period (1982-2007)

The statement	1982	1995	2001	2006	2007
The statement	1982	1995	2001	2006	2007
Cultivated area (10^3 feddan*)	250.9	300.8	318.9	321.4	326.9
Productivity (ton/ feddan)	35.09	45.94	49.65	50.77	50.96
Total Production (10^3 ton)	8805	13822	157.6	16327	16656
Supplied area (10^3 feddan)	187.7	251.5	265.5	239.1	245.7
Productivity of sup.area(ton/ feddan)	35.55	39.33	38.2	39.66	40.3
Supplied Production quantity(10^3 ton)	6671	9889	10143	9483	9910
%Sup. Production to the total prod.	75.8	71.5	64.6	58.1	59.5
Cane Sugar Production(10^3 ton)	682	1004	1009	1072	1075
Farm price (L.E./ton)	18.2	90	95	165	170
Production costs (L.E/ feddan)	505	2662	3519	4412	4602
Net revenue/ feddan(L.E/ feddan)	123	1494	1222	3996	4080

* One feddan = 4200 m^2

Reference: Collected and computed from:

Ministry of agriculture and land reclamation: " sugar crops and sugar production in Egypt", annual report of sugar crops council,(2007).

Ministry of agriculture and land reclamation, Section economic affairs, central administration for economic agriculture, unpublished information.

feddan of sugarcane as shown from the table revealed an increase for the supplied area from about 35.55 ton per feddan in the year 1982 to about 40.3 ton in the year 2007 by an increasing ratio of about 13.4%.

For the development of the total production supplied to the factories from sugarcane on which the production of sugar depends directly; it is shown from Table 6, a fluctuation for the supplied quantity of sugarcane in the period(1982-2007) between a minimum of about 6.67 million tons in 1982 and a maximum of about 10.1million tons in 2007. It is worthy to state that a declination has been observed for the relative importance of the production quantity supplied to the sugar factories from about 75.8% in year 1982 to about 59.5% in year 2007 pointing to a strong competition with the other uses of sugarcane such as production of molasses, consumption of fresh juice,….etc.

By studying the factors affecting the decision of the farmer to cultivate sugarcane including the ton price, production costs and the net revenue it is shown from Table 6 that the ton price has increased from L.E. 18.2 in the year 1982 to L.E. 170 in the year 2007 by an increasing ratio of 934% and the production costs has increased from L.E. 505/ton in 1982 to about L.E. 4604 in 2007 by an increasing ratio 911%. This is an indication to the increasing rate of increasing in production costs than that of the supplied ones which in turn affects the net revenue for the farmer. The data of the table revealed a net increase in the revenue of sugarcane crop from about L.E. 123/feddan in 1982 to about L.E. 4080 in 2007.

Secondly: Domestic Production from Sugar Beet and its Determinants": Production of sugar in Egypt from sugar beet was introduced recently. It represented about 33.9% in the period (2005-2007). Cultivation of sugar beet concentrates in Kafr El-sheikh, El-Dakahlya, El-Fayoum, Beni-Suef, El-Sharquia, El-Garbia and El-Minya governorates where it reached about 85.1% of the total beet area which was 249.2 thousand feddan in 2007. The production of these governorates was 4.78 million tons which represents about 87.4% of the total production and with a productivity of about 22.54 ton per/feddan in average. El-Minya performed the highest productivity of about 29.43 ton per/feddan.

The power production of the four sugar beet factories other than that at Nobaria is designed to be about 3.3 million tons of beet. All work with over-capacity except the factory at Abo-Karkas which had about 78.5% of its capacity in the year 2007[7]. This necessitates a quick working of Nobaria factory and pushing the investments for establishments of new beet sugar factories to consume the expected expansion in its production.

Determinants of Beet Sugar Production: Production of beet sugar depends on the cultivated area, its productivity and the price per ton. Table 7 showed a continuous increase in the cultivated area which provides the factories with sugar beet. It was about 16.94 thousand/feddan in 1982 while 247.3 thousand feddan in 2007 with about 1460% increase. Table 7 showed also that the productivity of sugar beet per feddan has been increased from 10.95 ton/feddan in 1982

Table 7: Development of some technical and economic indicators for sugar beet in the period (1982-2007)

The statement	1982	1995	2001	2006	2007
Cultivated area (10^3 feddan*)	16.94	50.1	148.9	186.3	248.3
Productivity (ton/ feddan)	12.61	18.36	20.04	21.1	21.98
Total Production(10^3 ton)	213.7	920	2984	3931	5458
Supplied area (10^3 feddan)	16.94	47.35	148.3	184	247.3
Productivity of sup.area (ton/ feddan)	10.95	18.35	19.08	19.57	21.13
Supplied Production quantity (10^3 ton)	185.5	869	2830	3601	5226
%Sup. Production to the total prod.	86.8	94.4	94.8	91.6	95.7
Production of beet Sugar (10^3 ton)	16.9	127.5	397	503.3	682.6
Farm price (L.E./ton)	24.1	80.1	100	171	187.5
Production costs (L.E/ feddan)	185	965	1520	1886	1959
Net revenue/ feddan (L.E/ feddan)	105	524	480	1722	2163

Reference: Collected and computed from:

1-Ministry of agriculture and land reclamation: " sugar crops and sugar production in Egypt", annual report of sugar crops council,(2007).

Ministry of Agriculture and land Reclamation, Section economic

to 21.13 ton/feddan in 2007. The total sugar beet production supplied to the factories has increased from about 0.185 million ton in 1982 to about 5.226 million tons in 2007 depending the increase in both the cultivated area and productivity. This represents about 95.7% of the total production of sugar beet. The most important factor controlling cultivation of sugar beet is the net revenue as revealed from the Table 7.

By studying the factors affecting the decision of the farmer to cultivate sugar beet including the ton price, production costs and the net revenue it is shown from Table 7 that the ton price has increased from L.E. 24.1 in the year 1982 to L.E. 187.5 in the year 2007 by an increasing ratio of 778% and the production costs has increased from L.E. 85/ton in 1982 to about L.E. 1959 in 2007 by an increasing ratio 1059%. This is an indication to the increasing rate of increasing in production costs than that of the supplied ones which in turn affects the net revenue for the farmer. The data of the table revealed a net increase in the revenue of sugar beet crop from about L.E. 105/feddan in 1982 to about L.E. 2163 in 2007.

The Economic Efficiency for the Production of Sugar from Both Sugar Beet and Sugar Cane: Table 8 revealed that sugar production was 4.39 ton /feddan of sugarcane and 2.73 ton/feddan of sugar beet, this constitutes about 11.01% and 13.7% of the supplied cane and beet, respectively as a mean in the period (2005-2007). This means that production of sugar from beet exceeds that from cane by about 2.69% taking into consideration that the productivity of cane is 39.9 ton/feddan and for beet 19.93 ton/feddan in addition to the staying period in the land. Beet sugar gives about 0.455 ton sugar in month while cane sugar gives 0.366 ton sugar in month, taking into consideration the productivity of both types and the period of stay in the land. It is difficult to make expansion in the area cultivated with sugarcane due to the limited water resources where it needs 12400m^3/ per feddan while sugar beet needs 3500m^3/ per feddan. The productivity of sugar using one unit of irrigation water (1000m^3) in case of beet is more than double that in case of cane as shown from the table where it was 0.354 ton for cane and 0.78 ton for beet and as a consequent the net revenue from one unit water of irrigation was about L.E. 320 for cane and L.E. 506 for beet.

Production of a ton cane sugar needs 145% relative to that of beet sugar. This means that production of a ton from cane sugar exceeds that from beet, while the farm price of the latter is about 84.3% from the farm price of that from cane which was L.E 1264. This indicates a decrease in the price of the supplied beet. It is shown also that the farm price of sugar is less than that of the imported one. It reaches about 66% for beet sugar and 82% for cane sugar. It is revealed from the table that the net revenue per month for the farmer of cane is equivalent to about 112% from that of the beet farmer. In the light of that it seems that the efficiency of sugar production from beet is better than from cane under the limited available lands and water resources in spite of the decrease of the farm price and the net revenue in case of beet relative to cane crops.

Table 8: Economic efficiency indications of sugar production from sugarcane and sugar beet as a mean in the period (2005-2007)

The statement	The unit	cane Sugar	Beet sugar
Production of Sugar	(ton/ feddan*)	4.39	2.73
Production of Sugar in month	(ton/ feddan/ month)	0.366	0.455
Production of irrigation water unit	(ton/1000 m3)	0.354	0.78
% Sugar Production	-	11.01	13.7
Costs of ton Sugar Production	L.E./ton	1010	697
Farm price of Sugar/ton	L.E./ton	1499	1264
% Farm price to the import price	-	82	66
Net month revenue	L.E./ feddan /ton	331	295
Net revenue of irrigation water unit	L.E./ 1000m3	320	506

Reference: Collected and computed from:

1-Ministry of agriculture and land reclamation: "sugar crops and sugar production in Egypt", annual report of sugar crops council different issues.

2-The Central Agency for Public Mobilization and Statistics, information, unpublished information.

Future Vision of a Potential Improvement for the Self-sufficiency of Sugar: Improvement of self-sufficiency of sugar in Egypt could be achieved by increasing sugar production and rationalization of consumption.

Firstly: Increasing production requires increasing the cultivated area, productivity and investments directed to sugar production beside improving the production process which increases the amount of extracted sugar.

Increase of the Cultivated Area: Because of the limited water resources; the expansion in the area of sugarcane became unlogic and not accepted. So the present and future aim is to fix the cultivated area of this crop. In the same time it is reasonable to make expansion in cultivation of sugar beet due to its low needs of water and better efficiency in sugar production relative to sugarcane. This can be achieved by encouraging the farmers to fix the area cultivated by cane and to expand the area cultivated by sugar beet through adjusting the price policy for the sugar crops in such a way that helps the cultivation policy and improving the ratio of sugar self-sufficiency (by equality of farm price and importing price), or putting a safety price which gives the farmer suitable profit margin encouraging him to continue the cultivation of sugar crops. Also, it is possible to make expansion in the cultivation of sugar beet in the new lands at El-Minea and Sohag governorates, cultivated and reclamated lands at Nobaria, the western area of the project of piece canal which extends from Faraskour dam to south Port Said, Hosaynia plain and Bahr Elbakar area with a total area of 220 thousand feddans, beside the area of Tina plain east Suez canal which reaches 50 thousand feddans which suited successfully its cultivation.

Increasing the Feddanic Productivity: This can be achieved by using the modern technologies which had proved success in increasing the feddanic productivity of sugar crops. In case of sugarcane the modern technologies include laser leveling, the use of developed surface irrigation, addition of agricultural gypsum, preservation of the goodness and specifications of the commercial grade 5459 and elongation of its stay period through renewing its generations which represents about 99.5% of the total cultivated area with cane. The use of these technologies led to about 40% reduction in the water of irrigation and 30% increase in the productivity of cane. While the application of such modern technologies in sugar beet cultivation led to an increase by about 4.4 ton in the feddanic productivity.

Increasing the Investments Directed to the Sugar Industry: Expansion of the sugar production from both cane and beet requires opening new lines for production in the factories to increase their working efficiency to about 98% in the season 2007 and constructing new factories in the lands of expansion where the working efficiency reaches about 109% in the season 2007.

Increasing Sugar Produced from Cane and Beet: This depends on some technical points dealing with the manufacture process itself and some regulating factors for the quick manufacture after breaking and harvest to avoid reduction of the sugar ratio and enhancing the supplying process to the sugar factories beside immediate paying of the total crop price after supplying.

Secondly: Rationalization of the Consumption: This could be achieved by introducing the right culture of consumption through the media and changing the wrong habits dealing with extensive consumption of sugar and its products, beside reducing the support directed to the sugar price which doesn't reach the right consumers mostly but go to the big distributors. The study aims at reducing the consumption of sugar to be in the range of about 30kg/year, or kept it at the level of 34kg/year which prevailed in the last two years.

Future Vision: for a potential improving the ratio of self-sufficiency of sugar the study made a postulation for the rate of population increase by about 1.9% in the period (2008-2017) and provided three alternatives for this purpose.

The First Alterative:

- Maintenance of the cultivated area with cane and that supplied the factories till the years 2012 and 2017 which were about 326.9 and 245.7 thousand feddan, respectively in the year 2007, an increasing the productivity by the same rate of the period (1998-2007) which was about 1.4% to reach 43.15 and 46 ton in 2012 and 2017, respectively. This productivity has been achieved already in some areas producing sugarcane, beside maintenance of the sugar ratio at the level of 2007 which was 10.85%.
- Increase of area and productivity of sugar beet by the same annual rate in the period (1998-2007) which were 10% and 1.2%, respectively, that the cultivated area reaches to about 370.95 and 494.6 thousand feddans and the productivity reaches about 22.4 and 23.67 ton/feddan in the years 2012 and 2017, respectively, in addition to maintaining the sugar ratio at the level of 2007 which was about 13.05%.
- Decrease the mean share of person from sugar to about 30 kg/person/year. This has been achieved in 2003.

The table showed that it is possible to reach a self sufficiency of sugar in the range of about 88.6% and 99.4% in the years 2012 and 2017, respectively, with a production volume of about 2234 and 2754 thousand tons and consumption volume of about of about 2521 and 2770 thousand tons in the same years, respectively. This will save about 184.6 and 274.6 million dollars in the year 2012 and 2017, respectively according to the international price of 2007.

The Second Alternative:

- Maintenance of the area of sugarcane supplied to the factories till the years 2012 and 2017 as in 2007 which was about 326.9 and 245.7 thousand feddan, respectively and increasing the productivity annually by 3% by the application of the suitable technologies to reach 46.38 and 52.43 ton in the years 2012 and 2017, respectively and increasing the sugar ratio by about 0.5% and 1% in the same years.
- Increasing the area of sugar beet in the new lands by about 220 thousand feddans in the expected period by equal ratios and increasing the productivity of beet by 2.08%/year by applying the suitable technologies to reach 23.33 & 25.53 tons in the years 2012 & 2017, respectively.
- Maintenance of the share/person from sugar in the expected period as it was in 2007 i.e. 34 kg/person/ year.

The second alternative points to the ability of self-sufficiency of sugar by a ratio 83.16% & 99.78% in the years 2012 & 201, respectively. The production volume is estimated as 2376 & 3132 thousand tons and the consumption by about 2857 & 3139 thousand tons in the previous years, respectively. This will save about 120.2& 277.6 million dollar in the years 2012 & 2017, respectively according to the international price in 2007 and saving about 835.4 million m^3 water/ year by application of laser leveling and developed surface irrigation for the sugarcane supplied areas.

The Third Alternative:

- Applying the same principles of the second alternative for increasing the domestic production of sugar.
- Applying the same principles of the first alternative for rationalizing the consumption and reaching with the personal share to 30 kg /year.

The third alternative revealed as shown form Table (9) that it is possible to reach a self-sufficiency ratio of sugar of about 94.24%& 113.08% in the years 2012 & 2017, respectively, where the production volume is expected to be about 2376 & 3132 thousand tons and the consumption about 2521& 2770 thousand tons, respectively. This will save about 231.7 & 400 million dollars in the same years, respectively according to the international price of 2007, beside saving about

Table 9: Improvement indications of sugar self-sufficiency ratio in Egypt

			1st alternative		2nd alternative		3rd alternative	
The statement	The unit	2007	2012	2017	2012	2017	2012	2017
Sugarcane area	10^3 feddan	326.9	326.9	326.9	326.9	326.9	326.9	326.9
Supplied Sugarcane area	10^3 feddan	245.7	245.7	245.7	245.7	245.7	245.7	245.7
Productivity of Supplied cane	ton feddan	40.33	43.15	46	46.38	52.43	46.38	52.43
Quantity of Supplied cane	10^3 ton	9910	10602	11302	11395	12882	11395	12882
Sugar ratio	%	10.85	10.85	10.85	11.35	11.85	11.35	11.85
Cane Sugar Production	10^3 ton	1075	1150	1226	1293	1526	1293	1526
Sugar beet area	10^3 feddan	248.3	372.5	496.6	358.3	468.3	358.3	468.3
Supplied Sugar beet area	10^3 feddan	247.3	370.9	494.6	342.5	447.7	342.5	447.7
Productivity of Supplied beet	ton feddan	21.13	22.4	23.67	23.33	25.53	23.33	25.53
Quantity of Supplied beet	10^3 ton	5226	8309	11707	7990	11430	7990	11430
Sugar ratio	%	13.05	13.05	13.05	13.55	14.05	13.55	14.05
Sugar Production from beet	10^3 ton	682	1084	1528	1083	1606	1083	1606
Total Sugar Production	10^3 ton	1757	2234	2754	2376	3132	2376	3132
Mean consumption per capita	Kg/year	34	30	30	34	34	30	30
Population number	10^6 person	76.5	84.04	92.32	84.04	92.32	84.04	92.32
Total Sugar consumption	10^3 ton	2600	2521	2770	2857	3139	2521	2770
The gap	10^3 ton	-843	-287	-16	-481	-7	-145	362*
self-sufficiency	%	67.5	88.6	99.4	83.16	99.78	94.24	113.08

•Presence of Production surplus

835.4 million m^3 water/year by applying laser leveling and developed surface irrigation for the sugarcane supplied areas.

CONCLUSIONS AND RECOMMENDATIONS

The study revealed a declination in the self-sufficiency of sugar in the recent years, with a consequent big load on the government to fulfill the consumption needs of sugar, specially after the increase in its international price due to due to the direction of several countries producing sugar to the production of bio-ethanol from the sugar crops. This necessitates the increase of the domestic production of sugar and rationalization of its consumption. The increase of production needs a horizontal expansion in the area of sugar beet in the new lands and maintaining the area of sugarcane at 326.6 thousand feddan, beside improving the productivity of both crops by introducing the new technologies in both cultivation and production. Rationalization of consumption is necessary to reach the level of 2003.

The study recommends putting a fair policy for sugar crops prices and increasing the investments directed to the sugar industry by opening new-production lines in the already present factories and establishment of new factories to produce beet sugar in the new areas.

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