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ECONOMIC RETURN TO RE-ORIENTATE IMPORTS OF CORN AND SUNFLOWER OILS IN EGYPT

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ABSTRACT: First: The geographical distribution of imports of corn oil in Egypt: The (free) alternative: in which imported quantities of corn oil are left to be distributed in a free way to various countries according to the least expensive and under the restriction of the capacity of those exporting countries, in addition to the volume of Egyptian import capacity of corn oil from all countries and the import capacity does not exceed the average. The annual amount of imports from it in the average period (2014-2017). With regard to the free and private alternative to leaving the quantities of imported corn oil distributed freely in different countries according to the lowest prices and according to the exporting capacity of the countries, it was found that the quantities imported from corn oil were distributed in two countries, Saudi Arabia and the United States of America, with an estimated rate of 68.81% and 31.19% on the sequence is out of the total imported quantities, and this alternative has achieved an estimated cost of approximately 43721.35 thousand dollars, meaning that it saves about 4290.57 thousand dollars, which represents 8.94% of the current model. It is clear from the study that the (free) alternative to distributing imports of corn oil is the best proposed alternative, because this alternative has achieved an estimated cost of approximately 43721.35 thousand dollars, meaning that it saves about 4290.57 thousand dollars, which represents about 8.94%. Second: The geographical distribution of sunflower oil imports in Egypt. Alternative (European Union Countries Market): It clarifies that the quantity of Egypt's imports of sunflower oil from all countries of the European Union market is not less than the average amount that Egypt imported from each country during the study period, so that it does not exceed the average of its export capacity and not more than average of the total amount of Egypt's imports during the average period (2014-2017). It is clear from the study that an alternative (European Union countries) to distribute sunflower oil imports is the best proposed alternative, because this alternative has achieved an estimated cost of about 413076.06 thousand dollars, meaning that it saves about 17191.86 thousand dollars, representing about 3.99%. The study recommended the following proposals: Preparing sound model plans for the geographical redistribution of Egyptian imports of agricultural crops in general and oil crops in particular in the form that is in favor of the Egyptian balance of payments. Redistributing Egyptian imports of corn oil and sunflower oil from other countries, commensurate with the export capacity of these countries, that could be achieved by reducing the proceeds of imports under restrictions, and it is clear from the study that the first (free) alternative to distributing imports of corn oil is the best alternative and the exporting power of the exporting countries. This alternative achieved an estimated cost of approximately 43721.35 thousand dollars, it saves about 4290.57 thousand dollars, representing about 8.94%. It is clear from the study that the fourth alternative (European Union countries) to distribute sunflower oil imports and it is the best suggested alternative, because this alternative has achieved an estimated cost and that is, it achieves savings of about $ 17191.86 thousand, representing about 3.99%.

Key words: Economic return, re-orientate imports, corn oil , sunflower oil, Egyptian imports.

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INTRODUCTION

The demand for oil crops is a demand derived from the demand for the importance of the production of edible oil crops, which constitute an important prevailing and essential nutritional pattern for the Egyptian consumer. As it is considered an important source of capacity and contains 9 calories/gram, which is twice as much as what carbohydrates and proteins give. It also contains unsaturated fatty acids and some essential fatty acids for the body such as linoleic and linolink as well as containing Fat-soluble vitamins like (K/E/D/A) (**Ibrahim, 2007**).

In addition to the inappropriate use of oil crops in other industries such as varnish, soap, animal feed, *etc.,* this study examined the economic return of re-directing oil imports from corn and sunflower oil during the average period (2014-2017) in ARE.

Egyptian economic policies are currently seeking to work to reduce Egyptian imports of corn oil and sunflower oil in order to reduce the burden on the balance of payments. Therefore, this research will address the use of the linear programming model as one of the analytical methods in economic planning to reach the distribution that achieves the best scenarios that achieve the lowest possible value **(Tolba, 2017)**.

Research Problem

Despite the nutritional and economic importance of the crops in question, and although Egypt occupies the forefront in the acre productivity of these crops worldwide, the continuous increase in population rates, which is accompanied by an increase in the rates of food consumption in general and edible oil crops in particular in this respect, All these factors led to a severe deficiency in the rates of self-sufficiency and the widening gap between both production and local consumption of these crops, which requires resorting to adopting an import policy from abroad to fill this deficit, which led to the occurrence of imbalances that in turn affected the Egyptian agricultural trade balance.

Research Objective

The main objective of this study includes the foreign trade of some oil crops in the Arab Republic of Egypt. To achieve this, the study aimed to shed light on the following aspects:

1. Directing and organizing the use of available agricultural resources and trying to achieve the optimum use of these resources, that is, this method is considered an aid to making sound economic decisions at the micro and macro levels.
2. Planning the appropriate financing and investment to achieve the highest possible return from investments.
3. Overcoming transportation and distribution problems by making an optimal plan with the lowest possible cost and the highest possible distribution efficiency.
4. Study the future expectations of production capacity, the size of the food gap, and the rate of self-sufficiency.

Research Method

The study relied to achieve its objectives on the analytical method in terms of both descriptive and quantitative terms, where some directional models were used when studying the evolution of the variables of the oils under study, and the linear programming method was used Linear Programming (LP), to determine the optimal use of agricultural resources.

Data Sources

The study relied on the published and unpublished secondary data for the economic variables of the two oils studied during the average period (2014-2017) in Egypt, issued by the Central Agency for Public Mobilization and Statistics and its Foreign Trade Database (FAO) and the Food and Agriculture Organization of the United Nations

ESULTS AND DISCUSSION

The Geographical Distribution of Imports of Corn oil in Egypt

Corn is the first crop among the important and strategic summer essential grains of exporting economic importance, as its widespread use as food for humans and animals at the same time. However, the total production is not sufficient for the consumption needs, which led to an increase in imports.

From all of the above it is clear that there is a gap between the imported quantities of corn oil and the export capacities of the most important exporting countries, which indicates the possibility of increasing our imports, especially in countries with high export capacities and low prices. This encourages us to take advantage of these conditions by preparing a plan for the geographical redistribution of these imports in a manner that is in the interest of the Egyptian balance of payments.

Based on the foregoing, the necessity of working to redistribute Egyptian imports of corn oil from exporting countries in a manner commensurate with the export capacity of these countries. To achieve this goal, alinear programming method was used written in order to reach the best distribution of Egyptian imports of corn oil, which is achieved by minimizing the proceeds of imports in light of restrictions represented in the exporting energy of the exporting countries.

The Current Distribution

It is the current distribution of imported quantities of corn oil from different countries of the world, each country according to the quantity imported from and the price of importing a ton of oil.

Restrictions

The first (free) alternative

Which the imported quantities of corn oil are left free to be distributed in various countries according to the least expensive and under the restriction of the capacity of those exporting countries, in addition to the Egyptian import capacity of corn oil from all countries and the capacity does not increase Imports for the annual average amount of imports from it in the average period (2014-2017).

The second alternative (the market of the most stable countries)

It clarifies that the quantity of Egyptian imports of corn oil from each country (from the most stable countries) that are not less than the average amount of Egypt's imports from each country, so that it does not exceed the average of its export capacities nor It exceeds the average of the total amount of Egypt's imports during the average period (2014-2017).

The third alternative (the market for the least expensive countries)

It clarifies that the quantity of Egyptian imports of corn oil from each country (from the least expensive countries) are the countries that do not exceed the average price of Egypt's imports from the countries during the study period, so that it does not exceed the average of its export capacities and not more than the average of the total amount of Egypt's imports during the average period (2014-2017).

The Fourth alternative (European Union market)

It clarifies that the quantity of Egyptian imports of sorghum oil from all countries of the European Union market is not less than the average amount that Egypt imported from each country during the study period, so that it does not exceed the average of its export capacities. And it does not exceed the average of the total amount of Egypt's imports during the average period (2014-2017).

Target function

It targets the value of the proceeds of imports of corn oil during the average period (2014-2017). To formulate this function, the average price of tons of corn oil was used during the study period, and the average quantity that can be imported from different countries was used, and thus it is possible to formulate the target function as follows:

$$MinZ= 1087\ X_1 + 1497\ X_2 + 1162\ X_3 + 1128\ X_4 + 1198\ X_5 + 1322\ X_6 + 1400\ X_7 + 1311\ X_8 + 1315\ X_9 + 1000\ X_{10} + 1510\ X_{11} + 1530\ X_{12}$$

Xi expresses

The imported quantity of corn from different countries as follows:

Group of countries: which includes the United States of America (X1), Spain (X2), Brazil (X3), Canada (X4), Argentina (X5), Turkey (X6), China (X7), Ukraine (X8), France (X9), Saudi Arabia (X10), UAE (X11) and Greece (X12).

Alternative activities

It represents the countries that export sorghum oil.

Import restrictions

Represented by the export capacities per ton for the exporting countries, as well as the current import quantities during the study period.

This model has been given an import cost that is reflected in Table 1 estimated at $ 48011.92 thousand.

The results of the proposed alternatives, which are shown in Table 1, indicate the following:

As for the current model, the percentage of imports from various countries amounted to about 42561 tons, at a value of $ 48011.92 thousand, at an import price of $ 1288.8/ton during the average period (2014-2017).

With regard to the first alternative for leaving the quantities imported from corn oil to be distributed freely to different countries according to the lowest prices and according to the exporting capacity of the countries, it was found that the quantities imported from corn oil were distributed among two countries, Saudi Arabia and the United States of America, with an estimated rate of 68.81% and 31.19% on the sequence is from the total imported quantities, as shown in Table 2 and this alternative has been achieved import cost reflected in Table 6 estimated at $ 43721.35 thousand, meaning that it achieves savings of about $ 4290.57 thousand, representing 8.94% of the current model.

As for the second model

The most suitable geographical distribution for corn oil imports for the most stable countries during the average period (2014-2017).

It was found that the quantities imported from corn oil were distributed to 6 different countries, which are the United States of America, Spain, Saudi Arabia, Turkey, France and the United Arab Emirates, with rates estimated at about 86.99%, 8.37%, 3.73%, 0.52%, 0.30%, 0.11%, respectively, of the total quantities imported, as shown in Table 3 and the model has achieved an import cost reflected in Table 3 estimated at about $ 47703.88 thousand, *i.e.* with a savings of about $ 308.04 thousand, representing 0.64% of the current model.

As for the third model

The most suitable geographical distribution for imports of corn oil according to the model (the market for the least expensive countries) during the average period (2014-2017).

The current model is redistributed, excluding the countries in which the import price of tons exceeds 1288.8 dollars/ton, which is the average import price during the average study period. With rates estimated at about 86.98%, 10.09%, 1%, 0.98%, and 0.95%, respectively, of the total imported quantities, as shown in Table 4. This model has achieved an import cost that is reflected in Table 4 around 45999.59 thousand dollars, *i.e.* with a savings of about 2012.33 thousand dollars, representing 4.19% of the current model.

As for the fourth model

The fourth alternative for the most suitable geographical distribution of corn oil imports according to the model of European Union countries in the average period (2014-2017).

It was found that the quantities imported from corn oil were distributed to 5 different countries, namely Spain, France, Greece, Saudi Arabia and the United States of America, with rates estimated at about 8.37%, 0.30%, 0.01%, 68.81% and 22.52%, of the total imported quantities. It is shown in Table 5 that this alternative has achieved an import cost that is reflected in Table 5 Estimated at about 45213.35 thousand dollars, meaning that it saves about 2798.57 thousand dollars, representing 5.83% of the current model.

From the above results, it is clear that the first (free) alternative to distributing imports of corn oil is the best proposed alternative, because this alternative has achieved an import cost reflected in Table 6 estimated at 43721.35 thousand dollars, meaning that it saves about 4290.57 thousand dollars, representing about 8.94%.

Second: The geographical distribution of Egyptian imports of sunflower oil

The sunflower crop is considered one of the major and important oil crops due to the high percentage of oil in its seeds, and the quality of its cultivation in new lands has also been proven. Therefore, Egyptian economic policies are currently seeking to work to reduce Egyptian imports of sunflower oil in order to reduce the burden on the balance of payments. Therefore, the linear programming model will be used as an analytical method in economic planning to reach a distribution that achieves the best scenarios that achieve the lowest possible value from sunflower oil imports.

Table 1. The current quantitative and average price distribution of Egyptian imports of corn oil during the average period (2014-2017)

Imports from exports capacity (%)	Export capacity (Ton)	Import value		Average import price (dollar/ton)	The imported quantity		Variable	Country
		(%)	(Thousand dollar)		(%)	(Ton)		
8.13	455536	83.85	40257.12	1087.4	86.99	37022	X_1	USA
14.48	24587	11.11	5333.71	1497.82	8.37	3561	X_2	Spain
1.80	23603	1.03	493.31	1162.98	1.00	424.2	X_3	Brazil
1.80	23113	0.98	468.58	1128.02	0.98	415.4	X_4	Canada
1.80	22513	1.01	485.05	1198.54	0.95	404.7	X_5	Argentina
0.70	31632	0.61	291.50	1322	0.52	220.5	X_6	Turkey
1.81	8459	0.45	213.83	1400.3	0.36	152.7	X_7	China
1.80	7470	0.37	176.14	1311.53	0.32	134.3	X_8	Ukraine
0.51	24823	0.35	166.00	1315.37	0.30	126.2	X_9	France
0.17	29287	0.10	50.00	1000	0.12	50	X_{10}	Saudi Arabia
0.22	21502	0.15	69.99	1510.79	0.11	46.33	X_{11}	UAE
1.15	380	0.01	6.69	1530.77	0.01	4.37	X_{12}	Greece
—	—	100	48011.92	1288.8	100	42561		Total

Source: Collected and calculated from:
1.Central Agency for Public Mobilization, Statistics, Foreign Trade Database and unpublished data.
2.(FAO) Food and Agriculture Organization website http://www.fao.org/faostat

Restrictions (for current import quantities)		Alternative activities		Restrictions (for export Capacities)
455536	>	$\mathbf{X_1}$	>	37022
24587	>	$\mathbf{X_2}$	>	3561
23603	>	$\mathbf{X_3}$	>	424.2
23113	>	$\mathbf{X_4}$	>	415.4
22513	>	$\mathbf{X_5}$	>	404.7
31632	>	$\mathbf{X_6}$	>	220.5
8459	>	$\mathbf{X_7}$	>	152.7
7470	>	$\mathbf{X_8}$	>	134.3
24823	>	$\mathbf{X_9}$	>	126.2
29287	>	$\mathbf{X_{10}}$	>	50
21502	>	$\mathbf{X_{11}}$	>	46.33
380	>	$\mathbf{X_{12}}$	>	4.37
$\sum_{1}^{12} X_i$		<		42561

Table 2. The first model (free model) proposed for the optimal structure for Egypt's imports of corn oil during the average period (2014-2017)

Value (Thousand dollar)	Price (dollar/ton)	Total (%)	The quantity proposed to be imported (ton)	Country
29287.20	1000.00	68.81	29287.20	Saudi Arabia
14434.15	1087.40	31.19	13274.00	USA
43721.35		100.00	42561.20	Total

Source: Collected and calculated from:
1. Central Agency for Public Mobilization, Statistics, Foreign Trade Database and unpublished data.
2. (FAO) Food and Agriculture Organization website http://www.fao.org/faostat)

Table 3. The second model (the most stable countries) proposed for the optimal structure for Egypt's imports of corn oil during the average period (2014-2017)

Value (Thousand dollar)	Price (dollar/ton)	Total (%)	The quantity proposed to be imported (ton)	Country
40257.72	1087.40	86.99	37022.00	USA
5332.99	1497.82	8.37	3560.50	Spain
1585.67	1000.00	3.73	1585.67	Saudi Arabia
291.50	1322.00	0.52	220.50	Turkey
166.00	1315.37	0.30	126.20	France
69.99	1510.79	0.11	46.33	UAE
47703.88	–	100.00	42561.20	Total

Source: Collected and calculated from:
1. Central Agency for Public Mobilization and Statistics, Foreign Trade Database and unpublished data.
2. (FAO) Food and Agriculture Organization website http://www.fao.org/faostat

Table 4. The third model (the market for the lowest-priced countries) is proposed for the optimal structure for Egypt's imports of corn oil during the average period (2014-2017)

Value (Thousand dollar)	Price (dollar/ton)	Total (%)	The quantity proposed to be imported (Ton)	Country
40257.72	**1087.40**	**86.98**	**37022.00**	**USA**
4294.87	**1000.00**	**10.09**	**4294.87**	**Saudi Arabia**
493.38	**1162.98**	**1.00**	**424.24**	**Brazil**
468.61	**1128.02**	**0.98**	**415.43**	**Canada**
485.00	**1198.54**	**0.95**	**404.66**	**Argentina**
45999.59	**–**	**100.00**	**42561.20**	**Total**

Source: Collected and calculated from:
1. Central Agency for Public Mobilization and Statistics, Foreign Trade Database and unpublished data.
2. (FAO) Food and Agriculture Organization website http://www.fao.org/faostat

Table 5. The fourth model (European Union countries) proposed for the optimal structure for Egypt's imports of corn oil during the average period (2014-2017)

Value (Thousand dollar)	Price (dollar/ton)	Total (%)	The quantity proposed to be imported (Ton)	Country
5332.99	1497.82	8.37	3560.50	Spain
166.00	1315.37	0.30	126.20	France
6.67	1530.77	0.01	4.36	Greece
5505.66		8.67	3691.06	The total group of European Union countries
29287.20	1000.00	68.81	29287.20	Saudi Arabia
10420.49	1087.40	22.52	9582.94	USA
45213.35	–	100.00	42561.20	Total

Source: Collected and calculated from:
1. Central Agency for Public Mobilization and Statistics, Foreign Trade Database and unpublished data.
2. (FAO) Food and Agriculture Organization website http://www.fao.org/faostat

Table 6. The cost of Egyptian imports of corn oil in the current situation and under various different alternatives

Savings (realized return for the status)		Cost of imports (thousand dollars)	The current model and proposed alternatives
(%)	Thousand dollars		
–	–	48011.92	The current model
8.94	4290.57	43721.35	The first alternative
0.64	308.04	47703.88	The second alternative
4.19	2012.33	45999.59	The third alternative
5.83	2798.57	45213.35	The fourth alternative

Source: Calculated from tables data numbers (1, 2, 3, 4, and 5) in the study.

The group of different countries for the current distribution

They are the different countries for the current distribution of sunflower oil imports, which includes 11 countries, namely Russian Federation, Ukraine, Argentina, Bulgaria, Turkey, France, United Arab Emirates, Belgium, Netherlands, Germany and the United States of America. Russian Federation is one of the most countries that export sunflower oil to Egypt.

From all of the above it is clear that there is a gap between the imported quantities of sunflower oil and export capacities for the most important exporting countries, which indicates the possibility of increasing our imports, especially in countries with high export capacities and low prices. This encourages us to take advantage of these conditions by preparing a plan for the geographical redistribution of these imports in a manner that is in the interest of the Egyptian balance of payments.

Based on the foregoing, the necessity of working to redistribute Egyptian imports of sunflower oil from exporting countries in a manner commensurate with the export capacity of those countries. To achieve this goal, a linear programming method was used to arrive at the best distribution of Egyptian imports of

sunflower oil, which is achieved by minimizing the proceeds of imports in light of constraints represented in the exporting energy of the exporting countries. The current distribution as shown below:

The current distribution

It is the current distribution of the imported quantities from sunflower oil from different countries of the world, each country according to the quantity imported from it and the price of importing a ton of it.

Restrictions

The first alternative (free)

Which the imported quantities of sunflower oil are left freely distributed to various countries according to the least expensive ones and under the restriction of the capacity of those exporting countries, in addition to the volume of Egyptian import capacity from sunflower oil from all countries and the capacity does not increase imports for the annual average amount of imports from it in the average period (2014-2017)**.**

The second alternative (the market of the most stable countries)

Explains that the quantity of Egypt's sunflower oil imports from each country (from the most stable countries) that is not less than the average amount of Egypt's imports from each country, so that it does not exceed the average of its exporting capacities nor It exceeds the average of the total amount of Egypt's imports during the average period (2014-2017).

The third alternative (the market for the least expensive countries)

It clarifies that the amount of Egypt's sunflower oil imports from each country (from the least expensive countries) which are the countries that do not exceed the average price of Egypt's imports from the countries during the study period, so that it does not exceed the average of its export capacities and not more than the average of the total amount of Egypt's imports during the average period (2014-2017).

The Fourth Alternative (European Union Market)

It clarifies that the amount of Egypt's sunflower oil imports from all countries of the European Union market is not less than the average amount that Egypt imported from each country during the study period, so that it does not exceed the average of its exporting energies. And it does not exceed the average of the total amount of Egypt's imports during the average period (2014-2017).

Target function

It targets the value of the proceeds of imports of sunflower oil during the average period (2014-2017). In order to formulate this function, the average price of tons of sunflower oil was used during the study period, and the average quantity that can be imported from different countries was used. Formulate the target function as follows:

$$MinZ = 802\ X_1 + 863\ X_2 + 897\ X_3 + 940\ X_4 + 1319\ X_5 + 1114\ X_6 + 1364\ X_7 + 1378\ X_8 + 1091\ X_9 + 1372\ X_{10} + 1297\ X_{11}$$

Alternative activities

The countries exporting sunflower oil.

Import restrictions

Represented by the export capacities per ton for the exporting countries, as well as the current import quantities during the study period.

This model has been given an import cost that is reflected in Table 7 estimated at $ 430267.92 thousand.

The results of the proposed alternatives and shown in Table 7 indicate the following:

As for the current model

The percentage of imports from various countries reached 514952 tons, at a value of 430267.92 thousand dollars, and at an import price of 1131 dollars/ton during the average period (2014-2017).

With regard to the first alternative for leaving the imported quantities of sunflower oil distributed free to different countries according to the lowest price and according to the exporting capacity of the countries, it was found that the imported quantities of sunflower oil were distributed to one country, Russian Federation, at an estimated rate of 100%, and that of the total imported quantities, as shown in Table 8, this alternative has achieved an import cost reflected in Table 12. Estimated at about $ 412991.50 thousand, meaning that it saves about $ 17276.42 thousand, representing 4.02% of the current model.

Restrictions (for export alternative activities capacities)				Restrictions (for current import quantities)
1717548	>	X_1	>	270106
4419648	>	X_2	>	192984
511834	>	X_3	>	45991
272406	>	X_4	>	4935
552954	>	X_5	>	647
386842	>	X_6	>	142
22155	>	X_7	>	52
121997	>	X_8	>	41
465058	>	X_9	>	26
144328	>	X_{10}	>	16
35275	>	X_{11}	>	12
$\sum_{1}^{11} X_i$		<		514952

Table 7. The current, quantitative and average price distribution of Egyptian imports of sunflower oil during the average period (2014-2017)

Imports from exports capacity (%)	Export capacity (Ton)	Import value		Average import price (dollar/ton)	The imported quantity		Code	Country
		(%)	(Thousand dollar)		(%)	(Ton)		
15.73	1717548	50.35	216625.01	802	52.45	270106	X_1	Russian Federation
4.37	4419648	38.71	166545.19	863	37.48	192984	X_2	Ukraine
8.99	511834	9.59	41253.93	897	8.93	45991	X_3	Argentina
1.81	272406	1.08	4638.90	940	0.96	4935	X_4	Bulgaria
0.12	552954	0.20	853.39	1319	0.13	647	X_5	Turkey
0.04	386842	0.04	158.19	1114	0.03	142	X_6	France
0.24	22155	0.02	70.93	1364	0.01	52	X_7	UAE
0.03	121997	0.01	56.50	1378	0.01	41	X_8	Belgium
0.01	465058	0.01	28.37	1091	0.01	26	X_9	Netherland
0.01	144328	0.01	21.95	1372	0.00	16	X_{10}	Germany
0.03	35275	0.00	15.56	1297	0.00	12	X_{11}	USA
—	—	100	430267.92	1131	100	514952		total

Source: Collected and calculated from:
1. Central Agency for Public Mobilization and Statistics, Foreign Trade Database and unpublished data.
2. (FAO) Food and Agriculture Organization website http://www.fao.org/faostat

Table 8. The first model (free model) proposed for the optimal structure for Egypt's imports of sunflower oil during the average period (2014-2017)

Value (thousand dollar)	Price (dollar/ton)	Total (%)	Quantity (Ton)	Country
412991.50	802	100	514952	Russian federation
412991.50	–	100	514952	total

Source: Collected and calculated from:

1. Central Agency for Public Mobilization and Statistics, Foreign Trade Database and unpublished data.

2. (FAO) Food and Agriculture Organization website http://www.fao.org/faostat

As for the second model: the most suitable geographical distribution of sunflower oil imports for the most stable countries during the average period (2014-2017)

It was found that the quantities imported from sunflower oil were distributed to 6 different countries, which are Russian Federation, Ukraine, Argentina, Bulgaria, Turkey and France, with rates estimated at about 52.48%, 37.48%, 8.93%, 0.96%, 0.13% and 0.03%, respectively, from the total imported quantities as shown in Table 9, the model has achieved an import cost that is reflected in Table 12. Estimated at $ 430192.51 thousand, *i.e.* with a savings of about $ 75.41 thousand, representing 0.02% of the current model.

For the third model: the most suitable geographic distribution of sunflower oil imports according to the model (the market for the lowest countries) during the average period (2014-2017)

In it, the current model is redistributed, excluding the countries in which the import price per ton exceeds 1131 dollars/ton, which is the average import price during the average study period. It was found that the quantities imported from sunflower oil were distributed to 6 different countries, which are Russian Federation, Ukraine, Argentina, Bulgaria, France and the Netherlands. With rates estimated at about 52.60%, 37.48%, 8.93%, 0.96%, 0.03% and 0.01%, respectively, of the total imported quantities, as shown in Table 10, this model has achieved an import cost that reflects it Table 12 About 429865.52 thousand dollars, *i.e.* with a savings of about 402.4 thousand dollars, representing 0.09% of the current model.

The fourth alternative regarding the geographical distribution of sunflower oil imports according to the model of European Union countries in the average period (2014-2017).

It was found that the quantities imported from sunflower oil were distributed to 5 different countries, which are France, Belgium, the Netherlands, Germany and Russian Federation, with rates estimated at about 0.03%, 0.01%, 0.01%, 0.00% and 99.96%, of the total imported quantities. As shown in Table 11, this alternative has achieved an import cost that is reflected in Table 12 Estimated at $ 413076.06 thousand, meaning that it saves about $ 17191.86 thousand, representing 3.99% of the current model.

From the foregoing it is clear that the fourth alternative (European Union countries) to distribute sunflower oil imports is the best proposed alternative, because this alternative has achieved an import cost reflected in Table 12 estimated at 413076.06 thousand dollars, meaning that it saves about 17191.86 thousand dollars, representing about 3.99%.

Table 9. The second model (the most stable countries) proposed for the optimal structure for Egypt's imports of sunflower oil during the average period (2014-2017)

Value (Thousand dollar)	Price (dollar/ton)	Total (%)	Quantity (ton)	Country
216742.91	802	52.48	270253	Russian Federation
166545.19	863	37.48	192984	Ukraine
41253.93	897	8.93	45991	Argentina
4638.90	940	0.96	4935	Bulgaria
853.39	1319	0.13	647	Turkey
158.19	1114	0.03	142	France
430192.51	–	100.00	514952	total

Source: Collected and calculated from:

1. Central Agency for Public Mobilization and Statistics, Foreign Trade Database and unpublished data.

2. (FAO) Food and Agriculture Organization website http://www.fao.org/faostat

Table 10. The third model (the market for the lowest-priced countries) is proposed for the optimal structure for Egypt's imports of sunflower oil during the average period (2014-2017)

Value (thousand dollar)	Price (dollar/ton)	Total (%)	Quantity (ton)	Country
217240.95	802	52.60	270874	Russian Federation
166545.19	863	37.48	192984	Ukraine
41253.93	897	8.93	45991	Argentina
4638.90	940	0.96	4935	Bulgaria
158.19	1114	0.03	142	France
28.37	1091	0.01	26	Netherland
429865.52		100.00	514952	Total

Source: Collected and calculated from:

1. Central Agency for Public Mobilization and Statistics, Foreign Trade Database and unpublished data.

2. (FAO) Food and Agriculture Organization website http://www.fao.org/faostat

Table 11. The fourth model (European Union countries) proposed for the optimal structure for Egypt's imports of sunflower oil during the average period (2014-2017)

Value (thousand dollar)	Price (dollar/ton)	Total (%)	Quantity (ton)	Country
158.19	1114	0.03	142	France
56.50	1378	0.01	41	Belgium
28.37	1091	0.01	26	Netherland
21.95	1372	0.00	16	Germany
265.00	–	0.04	225	The total of the European Union
412811.05	802	99.96	514727	Russian Federation
413076.06	–	100.00	514952	Total

Source: Collected and calculated from:

1. Central Agency for Public Mobilization and Statistics, Foreign Trade Database and unpublished data.

2. (FAO) Food and Agriculture Organization website http://www.fao.org/faostat

Table 12. The cost of Egypt's imports of sunflower oil in the current situation and under various different alternatives

Savings (Return on the status)		Cost of imports (thousand dollar)	The current model and proposed alternatives
(%)	Thousand dollar		
–	–	430267.92	The current model
4.02	17276.42	412991.50	The first alternative
0.02	75.41	430192.51	The second alternative
0.09	402.4	429865.52	The third alternative
3.99	17191.86	413076.06	The fourth alternative

Source: Calculated from the tables data numbers (7, 8, 9, 10, 11) in the study

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العائد الاقتصادي لإعادة توجيه واردات زيت الذرة الشامية وزيت دوار الشمس في مصر

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تعتبر المحاصيل الزيتية من أهم المحاصيل الاستراتيجية في القطاع الزراعي وذلك لكونها المصدر الاساسي للطاقة التي يحتاجها الإنسان فهي تمده بالبروتين والدهون ومصدر لكثير من الفيتامينات الذائبة في الدهون، وتستخدم أيضاً في الكثير من الاطعمة الغذائية الهامة المطلوبة، وتأخذ هذه المحاصيل الأهمية في أن الطلب عليها طلباً مشتقاً من الطلب على الزيوت النباتية الغذائية، فلابد من زيادة الكميات المنتجة لسد الفجوة الغذائية بها، أما عن طريق زيادة كميات إنتاج الزيوت وهو التوسع الرأسي، أو عن طريق زيادة المساحات المزروعة من هذه المحاصيل وهو التوسع الافقي، ويلزم ذلك ضرورة العمل علي إعادة توزيع الواردات المصرية من زيت الذرة الشامية من الدول المصدرة بما يتناسب مع الطاقة التصديرية لتلك الدول. ولتحقيق هذا الهدف فقد تم استخدام أسلوب البرمجة الخطية للتوصل إلي أفضل توزيع لواردات مصر من زيت الذرة الشامية، والذي يتحقق عن طريق تدنية حصيلة الواردات في ظل قيود تتمثل في الطاقة التصديرية للدول المصدرة ، وفي ظل تلك القيود تم عمل نموذج للوضع الراهن وعمل بدائل مختلفة لهذا التوزيع الراهن كما هو موضح فيما يلي: أولاً: التوزيع الجغرافي لواردات زيت الذرة الشامية في مصر: البديل (الحر): وفيه تترك الكميات المستوردة من زيت الذرة الشامية تتوزع بطريقة حرة علي مختلف الدول حسب أقلها سعراً وفي ظل قيد طاقة تلك الدول التصديرية، بالإضافة إلي حجم الطاقة الاستيرادية المصرية من زيت الذرة الشامية من جميع الدول ولا تزيد الطاقة الاستيرادية عن المتوسط السنوي لكمية الواردات منه في متوسط الفترة (2014-2017)، بالنسبة للبديل الحر والخاص بترك الكميات المستوردة من زيت الذرة الشامية تتوزع حرة علي مختلف الدول حسب أقلها سعراً ووفقاً للطاقة التصديرية للدول، وجد أن الكميات المستوردة من زيت الذرة الشامية توزعت علي دولتين هما السعودية والولايات المتحدة الامريكية وذلك بنسبة تقدر بحوالي 68.81% و 31.19% على التوالى وذلك من إجمالي الكميات المستوردة، ولقد حقق هذا البديل تكلفة استيرادية تقدر بحوالي 43721.35 ألف دولار، أي يحقق وفر قدره حوالي 4290.57 ألف دولار تمثل 8.94% عن النموذج الراهن، ويتضح من الدراسة أن البديل (الحر) لتوزيع واردات زيت الذرة الشامية هو أفضل البدائل المقترحة، لأن هذا البديل حقق تكلفة استيرادية تقدر بحوالي 43721.35 الف دولار، أي يحقق وفر قدره حوالي 4290.57 الف دولار تمثل حوالي 8.94%، ثانياً: التوزيع الجغرافي لواردات زيت دوار الشمس في مصر، بديل (سوق دول الاتحاد الأوروبي): يوضح أن كمية واردات مصر من زيت دوار الشمس من كل دول سوق الاتحاد الاوروبي بحيث لا تقل عن متوسط الكمية التي استوردتها مصر من كل دولة خلال فترة الدراسة، بحيث لا تزيد عن متوسط طاقاتها التصديرية ولا تزيد عن متوسط جملة كمية واردات مصر خلال متوسط الفترة (2014-2017)، ويتضح من الدراسة أن بديل (دول الاتحاد الاوروبي) لتوزيع واردات زيت دوار الشمس هو أفضل البدائل المقترحة، لأن هذا البديل حقق تكلفة استيرادية تقدر بحوالي 413076.06 الف دولار، أي يحقق وفر قدره حوالي 17191.86 الف دولار تمثل حوالي 3.99%. ولقد أوصت الدراسة بالمقترحات التالية: إعداد خطط نموذجية سليمة لإعادة التوزيع الجغرافي للواردات المصرية من المحاصيل الزراعية عامةً والزيتية خاصةً بالشكل الذي يكون في صالح ميزان المدفوعات المصرية. وإعادة توزيع الواردات المصرية من زيت الذرة الشامية وزيت دوار الشمس من الدول المصدرة بما يتناسب مع الطاقة التصديرية لتلك الدول والذي يتحقق عن طريق تدنية حصيلة الواردات في ظل قيود تتمثل في الطاقة التصديرية للدول المصدرة. ويتضح من خلال الدراسة أن البديل الرابع (دول الاتحاد الاوروبي) لتوزيع واردات زيت دوار الشمس هو أفضل البدائل المقترحة، لأن هذا البديل حقق تكلفة استيرادية تقدر بحوالي 413076.06 الف دولار، أي يحقق وفر قدره حوالي 17191.86 الف دولار تمثل حوالي 3.99%.

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