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A Study of the Economic Factors Affecting the Food Security Factor of Edible Oils in Egypt

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Abstract: The study aimed to identify the economic dimension of the food security policy for edible oils in Egypt during the period (2000-2019) by studying the current situation for the production and consumption of edible oils in Egypt, assessing the strategic stock and food security factor for edible oils, and studying the economic factors affecting the food security factor for edible oils during this period. To achieve the objectives of the study, econometric analysis was used by performing multiple regression analysis in the linear image using the (finite dependent variable model) Tobit Model, and performing unit root tests, co integration, causality test, in addition to descriptive analysis. By studying the current situation of food security, it was found that the quantity of strategic reserves of food oils amounted to about 428.25 thousand tons. Domestic consumption is sufficient for a period of 87.36 days, or about (2.91 months). The value of the food security factor during the study period was about 0.36. According to the unconventional analysis method known as the Tobit model to measure the impact of the most important economic factors that are supposed to have an indirect effect on the food security factor of edible oils, the most important of which are the population, exchange rate, agricultural investment, national income, import price with the exclusion of the variables related. The direct impact on the food security factor for edible oils, which is the amount of production, the amount of imports, the quantity of exports, and the amount of consumption of edible oils, because they are variables that are directly included in the calculations of the food security factor. The significance of the effect of these factors was proven, except for the exchange rate variable. The significance of the regression coefficients was not proven, in addition to matching the signs of the regression coefficients of the independent variables to the assumptions of economic theory, and reflecting the value of total elasticity, which amounted to about 0.0854, and this means that the increase of the variables under study referred to by 10%, but rather It increases the food security factor by 0.854%. The study recommends the necessity to increase the food security factor for edible oils from 0.36 to 0.50 according to food security considerations, and in order to form an appropriate strategic stock sufficient for domestic consumption for at least six months.
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Key words: Food Security Coefficient, Strategic Inventory, Tobit Model Test, Self-Sufficiency, Food Gap.

1. Introduction:

Oil crops are the main source of vegetable oils, which are one of the strategic commodities in Egypt, due to the daily consumption need for them, in addition to being one of the important productive elements that enter into many industries. Oil crops occupy an important place in the Egyptian agricultural economy, and their importance comes from the demand for them. It is a demand derived from the demand for the production of edible vegetable oils, which constitute a "prevalent and basic dietary pattern for the Egyptian consumer. Also, oil crops are industrial crops on which many food and medical industries and animal feed industries are based, which makes them play an effective role in the national economy, both agricultural and economically (1). It should be noted that vegetable oils have great nutritional importance as they are one of the richest nutrients in its energy and carbohydrate content, and most oils are characterized by its high content of unsaturated fatty acids and they also contain some fatty acids necessary for the body as well as containing some vitamins dissolved in fat.

Egypt faces sharp problem in the production of edible oils in light of insufficient local production to meet the growing demand for oils, which is due to the steady increase in population, changing income levels, consumer tastes and consumption patterns as a result of increasing health awareness, which leads to an increase in the volume of the nutritional gap for oils. The group of edible vegetable oil is the second place after grains in the list of Egyptian imports from the group of food commodities, as the average amount of oil imports amounted to about 1036.14 thousand tons, with a value of about $ 1.03 billion, representing about 2.16% and 11.26% of the average value of total national and agricultural imports respectively during The period (2000-2019) [8], and the self-sufficiency rate of vegetable oils in Egypt is estimated at 18.25%, and the food security factor for edible oils in Egypt is estimated at 0.36 as an average during the same period.

Achieving Egyptian food security is one of the necessary things that must be relied upon from sustainable local production sources. This requires increased attention to increasing local production of edible oils, and the concept of food security depends mainly on two axes. The first is the quantity and type of food required to achieve food security and the second axis is How to obtain food, whether from local or foreign sources, and ensure its flow from those sources [2]. There is no doubt that food insecurity is considered one of the most important threats to stability and security at the local, national, regional and international levels, as food is the first element of life, and therefore providing food with its various components to members of society at prices suitable for their income is a real challenge to the food policies of any country and is considered one of the most important reasons for establishing security In society and an indication of the relationship between governments and their citizens.

Therefore, the importance of promoting oil crops and introducing new non-traditional crops appears to be necessary to increase self-sufficiency rates and reduce the size of the food gap of oils.

Study Problem:

The research problem is that there is a gap between the domestic production of edible oils and the total consumption of it in Egypt, and then this gap causes the need to import large quantities of edible oils, which causes a "great" burden on the country's economic resources, in order to work to provide foreign currencies to import the oils. This negatively affects "the rates of development in Egypt, and thus a burden" on the Egyptian trade balance, in addition to increasing the burdens of food support, as food oils represent an essential component of the food support system in Egypt, which calls for studying all aspects of the food gap. Of oils in Egypt. And the need to maintain a strategic stock of edible oils, whether through local production or import, to provide consumer needs for the longest period of time to face emergency conditions as one of the basic components to achieve stability and food security in Egypt, where the average amount of local production of edible oils reached about 186.85 thousand tons and the average amount of local consumption About 1175.85 thousand tons during the period (2000-2019). Thus, the average amount of the gap of edible oils reached about 986.15 thousand tons during the same period.

Objectives of the study:

The research aims mainly to identify the economic dimension of food security policy for edible oils in Egypt through the following sub-objectives:

1. Study the current status of the production and consumption of edible oils in Egypt during the study period (2000-2019).

2. Estimate the strategic stock and food security factor of edible oils in Egypt during the study period (2000-2019).

3. Study the economic factors affecting the food security factor of edible oils in Egypt during the study period (2000-2019).

2. Methodology:

This study relied on descriptive and quantitative analysis to achieve its objectives, by using the following equations:

First: Calculating the food security factor for edible oils through the following economic equations.

1 - Production adequacy period for consumption = total domestic production ÷ daily domestic consumption.

2 - The period of adequacy of imports for consumption = total amount of imports ÷ daily domestic consumption.

3 - The amount of the surplus or deficit of edible oils = [(the sum of the length of the two periods of adequacy of domestic production and import coverage for consumption -365) x daily domestic consumption] - the quantity of exports.

- Food security factor = volume of strategic stocks (sum of surpluses and deficits) ÷ average annual domestic consumption. It can also be estimated through the sum of the percentage change in the strategic stock to the annual domestic consumption, and the value of the food security factor ranges between zero and the correct one, as the more the value of the food security factor approaches zero, the more food insecure and vice versa, while the closer the value of the food security factor is from The correct one the greater the food security of the commodity in the country [2], [3], [4].

5- Food surplus or gap:

The difference between what we can produce of commodities and foodstuffs and what is sufficient for the basic needs to provide food for the entire population, and can be calculated by the following equation:

Food surplus or gap = domestic production - available for consumption

6- Self-sufficiency ratio:

The analysis of self-sufficiency rates allows to identify the reality of the production situation of various food commodities, as it shows the ability of local production to meet consumer requirements, and it can be calculated by the following equation:

Self-sufficiency ratio = domestic production ÷ available for consumption.

Second: The Standard Estimation of the Tobit Regression (4)

In this part, the unit root test, cointegration test, causality test, and then the standard estimation of the regression model will be performed as follows:

1 - Unit root test:

To determine the non-stationary properties of time series variables both at levels or in the first difference, the Dickie Fuller test (DF) or the developed Dickie Fuller test (ADF) is used (in this paper we will be satisfied with the last test) where this is used. Time trend test or without it, the general mathematical formula for the Dickie Fuller (DF) test is as follows:

As for the (ADF) test, it is a development of the (DF) test, and by adding lagged values to the dependent variables added in estimating the mathematical formula for the DF test, and the developed mathematical formula is as follows:

The unit root tests are based on the parameter (y) t-test, and the following two hypotheses are tested:

1 - The null hypothesis that indicates that the time series is not inactive

Null Hypothesis H0: y = 0

2- The alternative hypothesis indicating the stationary of the time series

Alternative Hypothesis H1: y ≠ 0

2 - The cointegration test using the Johansson cointegration test:

After verifying that the time series are integrated of the same degree according to the previous static tests, the methods of joint integration can be used to study the regression relationship of the variables to be studied in the long term, and there are many tests that are used to verify the existence of co-integration between the variables of the time series, and the Johansson test is considered the best in If the model contains more than two variables, due to the possibility of more than one vector of cointegration, the covariance is verified by the Johansson test, where the test assumes the presence of P of the economic variables in the regression vector of degree K as follows:

$X_t = \mu + \pi_1 X_{t-1} + \ldots\ldots\ldots\ldots \pi_k X_{t-k} + e_t$

Where: **μ** represents the stator, ***π*** represents a matrix of degree p. The number of covariant vectors can be determined using the following tests:

A - Trace (the sum of the elements of the diameter of the matrix) and is calculated as follows:

$\lambda_{trace} = -T \sum_{i=r+1}^{P} ln\,(1 - \lambda i)$

B - The Maximum Eigen Values Test, which is calculated as follows:

max = -T ln (1- λ r + 1)

By calculating the value of the trace test and the maximum value (Max) of the variables for which the joint integration test is to be performed, if the calculated test value is greater than the tabular value, we reject the null hypothesis that there is no co-integration between the variables of the model to be estimated, and we accept the alternative hypothesis that there is The relationship of co-integration between the variables of the model to be estimated.

3- Causality Test:

The research will rely on Granger's method to test the causal relationship between the study variables, and according to this method, it is said that the variable X is the cause of the variable Y, if the current values of the variable Y can be better predicted using the previous values of the variable X than if it relies on the values of Y Only this indicates that changes in Xt precede changes in Yt, and Granger's methodology for causation can be illustrated as follows:

$$Yt = \sum_{i=1}^{n} \alpha_i x_{t-1} + \sum_{j=1}^{n} \beta_j Y_{t-i}$$

$$Xt = \sum_{i=1}^{n} \sigma_i x_{t-1} + \sum_{j=1}^{n} \delta_j Y_{t-j}$$

The direction of causation is from X towards Y if it is

$\sum_{j=1}^{n} \delta_j = 0$ And the $\sum_{i=1}^{n} \alpha_i \neq 0$

And vice versa is also true, the direction of causation is from Y towards X if it is

$\sum_{j=1}^{n} \delta_j \neq 0$ And the $\sum_{i=1}^{n} \alpha_i = 0$

The relationship is reciprocal, that is, the direction of causation is from Y towards X and from X towards Y, when

$\sum_{j=1}^{n} \delta_j \neq 0$ And the $\sum_{i=1}^{n} \alpha_i \neq 0$

This is by condition that the time series are stationary.

4 - Estimating the Tobit Model:

With regard to analyzing the impact of the most important factors that are supposed to have an impact on the food security factor of edible oils as a dependent variable, and the most important economic factors that can be considered indirectly influencing them as independent variables are population in million people (x1), exchange rate (x2), investment Agricultural prices are in billions of dollars (x3), total national income in billion dollars (x4), the import price in dollars per ton (x5), excluding the variables that have a direct impact on the food security factor of edible oils, which are the quantity of production, the amount of imports, the quantity of exports, and the amount of consumption of edible oils This is because they are variables that are directly included in the calculations of the food security factor.

The regression function will be estimated according to the unconventional analysis method known as the Tobit Model and this method is called (Tobit Censored - Truncated Regression) relative to James Tobin, which is used to estimate the parameters of the regression function with a limited dependent variable (where the value of the food security factor ranges from zero And the correct one with replacing the zero or negative observations with zero), and this method is used instead of using the traditional method of analysis (the OLS method) which assumes that there are no limits for the dependent variable (+ ∞, - ∞), and it can be proved that the OLS estimates are less than Actual values, and biased down when setting limits for the dependent variable (Y_I) are as follows:

$$Y_i = \beta x_i + u_i$$

Where random variables are normally distributed

$$u_i \approx (\sigma, \mu)$$

By setting a maximum for the dependent variable (Y_i), so that Yi = <C and thus the previous regression equation can be reformulated as:

$$\beta x_i + u_i \leq C$$

Thus, we find that:

$$u_i \leq C - \beta x_i$$

Therefore, the expectation of random error becomes not equal to zero, as the OLS method assumes. This prediction can be formulated as follows:

$$E(u_i | u_i \leq C - \beta x_i) \neq 0$$

That is, the expectation of the random error E (Ui) is a function of the independent variable (Xi) and so the remainder (Y - Y^) will be related to the independent variable, and therefore estimates of the model regression coefficients will be unacceptable if the OLS method is used. Where we expect the value of the random variable to diminish by increasing the value of the independent variable as long as B> O, and therefore the OLS estimates of the regression coefficients will be down-biased i.e. the estimates of the regression coefficients will be less than their actual value.

Therefore, the use of the unconventional analysis method known as the Tobit model, which allows setting limits for the dependent variable, became necessary to address the bias in the OLS estimates. There are two methods of estimating the first model, the regression method Truncated Tobit, where the zero and negative observations are deleted from the dependent variable and their counterpart with the independent variables, then the model is estimated over the rest of the observations, and the second method is Tobit Censored, where the model is fully estimated by entering all the observations and replacing the zero and negative observations in the dependent variable only with zero. To estimate the regression coefficients in this case, it is necessary to apply the Maximum Likelihood Estimator (MLE) method, (Akerolf 1980, Olsen 1978) where the regression equation in the model can be formulated as follows:

$$Y^* = \beta' x_i + u_i$$

whereas:

$$y_i = L_{1i} \text{ if } y_i < L_{1i}$$

$$y_i = Y^* \quad \text{if}$$

$$\Gamma^{1!} < \lambda < \Gamma^{2!}$$

$$y_i = L_{2i} \quad \text{if}$$

$$y_i > L_{2i}$$

Where L_{1i} expresses the minimum of the dependent variable (i) while L_{2i} expressing the maximum of the same change. While Y^* expressing the dependent variable between the minimum and maximum limits or the finite dependent variable.

To estimate the parameters of the regression function in this case using the MLE method, it is necessary to formulate (Madala, 1987) Likelihood Function [10], (Green 1993) [11], as follows:

$$L(\beta, \sigma | y_i, x_i, L_{1i}, L_{2i})$$

$$= \prod_{y_i = L_{1i}} \Phi\left(\frac{L_{1i} - \beta' x_i}{\sigma}\right).$$

$$\prod_{y_i = Y^*} \frac{1}{\sigma} \phi\left(\frac{y_i - \beta' x_i}{\sigma}\right). \prod_{y_i = L_{2i}} \left[1 - \Phi\left(\frac{L_{2i} - \beta' x_i}{\sigma}\right)\right]$$

Thus the expected value of the dependent variable E (Yi) becomes as follows:

$$E(y_i | L_{1i} < \overset{*}{Y} < L_{2i})$$
$$= \beta' x_i + E(u_i | L_{1i} - \beta' x_i < u_i < L_{2i} - \beta' x_i) + P(y_i - L_{2i})L_{2i}$$
$$= \beta' x_i + \sigma \frac{\phi_{1i} - \phi_{2i}}{\Phi_{2i} - \Phi_{1i}}$$

Whereas:

$$\Phi_{1i} = \Phi(\frac{L_{1i} - \beta' x_i}{\sigma}), \Phi_{2i} = \Phi(\frac{L_{2i} - \beta' x_i}{\sigma})$$
$$\phi_{1i} = \phi(\frac{L_{1i} - \beta' x_i}{\sigma}), \phi_{2i} = \phi(\frac{L_{2i} - \beta' x_i}{\sigma})$$

Each of the probability density function Φ, ϕ is known as a function of the probability distribution. Thus, it was possible to estimate the parameters of the regression function of the food security coefficient with a finite dependent variable.

The coefficient of determination is also estimated in the model as follows:

$$R^2 = 1 - \sum_{t=1}^{T} \varepsilon_t^2 / \sum_{t=1}^{T} (Y_t - Y^-)^2$$

$$\varepsilon_t = Y_t - (\sigma f(X_t \beta) + \sigma F(X_t \beta)(X_t \beta))$$

The elasticity's of the model are estimated as follows

$$\eta i = \beta i \dot{X}_i / \dot{Y}$$

Data sources:

The study relied on secondary data published by the Ministry of Agriculture and Land Reclamation, the Economic Affairs Sector, the Foreign Trade Bulletin, the Food Balance Bulletin, and the website of the International Central Bank, as well as previous studies and research conducted in this field.

3. Results and discussion:

Firstly: Study the current status of production and consumption of edible oils in Egypt:

By studying the current situation for the production and consumption of edible oils in Egypt, in order to identify the percentage of self-sufficiency and average per capita share during the study period (2000-2019), it is clear from Table (1) and Table (2).

The domestic production of edible oils increased from about 115 thousand tons in 2000 to about 273 thousand tons in 2019, an increase of 158 thousand tons of the quantity of production in the year 2000, and an average of about 186.85 thousand tons as an average for the study period (2000-2019). By estimating the general time trend equation for the development of the quantity of local production during the study period, Equation No. (1) presented in Table No. (2) indicates that the quantity of local production took a general increasing trend at a statistically significant annual rate of about 4.58 thousand tons or that represents about 2.45% of The general average of the quantity of local production, and the value of the coefficient of determination "R^2" was about 0.41, indicated that 41% of the changes in the amount of local production are due to the effect of time.

The population increased from about 63.97 million people in the year 2000 to about 99.80 million people in 2019, an increase of 35.83 million people in the year 2000, and an average of about 79.33 million people as an average for the study period (2000-2019). By estimation the equation of the general temporal trend of population development during the study period, Equation No. (1) Presented in Table No. (2) Indicated that the population took a general increasing trend at a statistically significant annual rate of about 1.85 million people, and an annual increase rate representing about 2.33% of the population. The general average of the population and the value of the coefficient of determination "R^2" was about 0.98, indicating that 98% of the changes in the population are due to the time factor.

The increase in the population resulted in an increase in the consumption of edible oils from about 494 thousand tons in 2002 to about 1976 thousand tons in 2019, an increase of 1482 thousand tons of the amount of consumption in 2002, and an average of about 1175.5 thousand tons as an average for the study period (2000-2019). By estimation the equation of the general time trend of the development of domestic consumption during the study period, equation No. (2) Presented in Table No. (2) indicates that the amount of domestic consumption took a general increasing trend at a statistically significant annual rate of about 71.58 thousand tons with an annual increase rate of about 6.1% of The general average of the quantity of domestic consumption, and the value of the coefficient of determination "R^2" was about 0.72, indicated that 72% of the changes in the amount of consumption are due to the effect of time.

It also resulted in an increase in the amount of domestic imports of edible oils from about 264.8 thousand tons in 2003 to about 1831.51 thousand tons in 2018, an increase of 1566.71 thousand tons from the amount of imports in 2003, with an average of about 1036.14 thousand tons as an average for the period of study. (2000-2019). By the estimation the equation of the general time trend for the development of the quantity of imports during the study period, Equation No. (1) Presented in Table No. (2) Indicated that the quantity of imports took a general increasing trend at a statistically significant annual rate of about 43.72 thousand tons, and an annual increase rate that represents about 4.22% of the average. The value of the coefficient of determination "R^2" was about 0.21, indicating that 21% of the changes in the quantity of imports are due to the influence of time. This led to an increase in the average per capita share of dietary oils from about 7.3 kg / year in 2002, to about 19.3 kg / year in 2006, an increase of 12 kg / year from the average per capita consumption in 2002, and an average of about 13.90 kg / year as an average, for the period of study (2000-2019). By the estimation the equation of the general time trend for the development of average per capita consumption during the study period, Equation No. (1) Presented in Table No. (2) indicates that the average per capita consumption took a general increasing trend at a statistically significant annual rate of about 0.427 kg with an annual increase rate of about 3.1% From the general average of per capita consumption, the value of the coefficient of determination "R^2" was about 0.36, indicating that 36% of the changes in the average per capita consumption are due to the time factor.

As shown in Table No. (1) The increase in the self-sufficiency ratio for edible oils from about 9.92% in 2015 to about 34.21% in 2002, an increase of 24.29% from the self-sufficiency rate in 2015, with an average of about 18.25% as an average for the study period (2000 - 2019 AD). By the estimation the equation of the general time trend for the development of the self-sufficiency ratio during the study period, Equation No. (4) Presented in Table No. (2) indicates that the self-sufficiency ratio took a general decreasing trend at a statistically significant annual rate of about 0.690% and an annual decrease representing about 3.78% of The general average of the self-sufficiency ratio, and the value of the determination coefficient "R^2" was about 0.32, indicating that 32% of the changes in the self-sufficiency ratio are due to the influence of the time factor.

Table (1): Development of local production, imports, exports, local consumption, population, self-sufficiency rate and average per capita share of edible oils during the period (2000-2019)

year	The amount of domestic production (thousand tons)	Imports quantity (thousand tons)	Consumption quantity (thousand tons)	Gap volume (thousand tons)	Exports quantity (thousand tons)	Population (millions)	Self sufficiency %	Average per capita consumption of edible oils (Kg / year)
2000	115	648.85	748	-633	33.60	63.97	15.37	11.7
2001	121	471.21	574	-453	21.87	65.29	21.1	8.8
2002	169	348.49	494	-325	24.75	66.62	34.21	7.3
2003	135	264.8	508	-373	32.94	67.96	26.57	7.5
2004	151	877.41	1001	-850	28.76	69.30	15.1	14.5
2005	204	1070.59	1248	-1044	24.81	70.65	16.35	17.7
2006	207	1206.55	1389	-1182	17.71	72.01	14.90	19.3
2007	248	580.2	786	-538	14.01	73.64	31.55	10.7
2008	175	514.34	736	-561	96.81	75.19	23.78	9.8
2009	176	504.24	714	-538	132.41	76.92	24.65	9.4
2010	174	1047.5	671	-497	101.61	78.68	25.93	8.5
2011	200	1211.91	1270	-1070	108.69	80.53	15.75	15.7
2012	176	1218.92	1458	-1282	146.33	82.30	12.1	17.6
2013	228	1532.78	1530	-1302	175.72	84.62	14.90	18.1
2014	199	1351.92	1324	-1125	147.64	86.81	15.03	15.2
2015	164	1501.33	1653	-1439	100.97	88.95	9.92	18.2
2016	179	1693.01	1731	-1552	138.10	91.02	10.34	18.3
2017	184	1653.34	1752	-1568	135.93	95.20	10.50	15.2
2018	259	1831.51	1947	-1688	111.60	97.14	13.30	16.8
2019	273	1194.05	1976	-1703	141.22	99.80	13.82	17.6
Average	186.85	1036.14	1175.5	-986.15	86.8	79.33	18.25	13.9

Source: Data collected and calculated from the Ministry of Agriculture and Land Reclamation, Economic Affairs Sector, Foreign Trade Bulletin, various issues.

- It was collected and calculated from the data of the Ministry of Agriculture and Land Reclamation, the Economic Affairs Sector, the Food Balance Bulletin, various issues.

As shown in Table (1), an increase in the volume of the food gap for oils from about 325 thousand tons in 2002 to about 1703 thousand tons in 2019, an increase of 1378 thousand tons from the size of the food gap in 2002, with an average of about -986.15 thousand tons. The equation of the general temporal trend for the development of the volume food gap during the study period, Equation No. (3) presented in

Table No. (2) indicated that the size of the food gap took a general increasing trend at a statistically significant annual rate of about 65.83 thousand tons with an annual increase rate of about 6.67% of The general average of the size of the food gap, and the value of the coefficient of determination "R2" was about 0.47, indicating that 47% of the changes in the size of the food gap are due to the influence of time.

Table (2): Equations for the general temporal trend of the development of local production and domestic consumption, self-sufficiency rate, average per capita consumption, population, imports and exports of edible oils during the period (2000-2019)

variable	No	Time trend regression equation	R^2	F	Average	Annual rate of change %
Total Production	1	Ŷi= 9034.18 + 4.58 Xi (3.55) **	0.41	**12.60	186.85	2.45
Total Consumption	2	Ŷi= 142668.43 + 71.58 Xi **(6.91)	0.72	**47.83	1175.5	6.1
Gap Volume	3	Ŷi= 131353.61 + 65.83Xi (4.01) **	0.47	16.21**	-986.15	6.67
Self Sufficiency Ratio	4	Ŷi= 1404.67 – 0.690 Xi (-2.94) **	0.32	8.66**	18.25	3.78-
Per capita consumption Average	5	Ŷi= 844.44 + 0.427 Xi (3.21) **	0.36	**10.3	13.9	3.1
Population	6	Ŷi= 3639.96 + 1.85 Xi (31.1) **	0.99	963.87**	79.33	2.33
Imports	7	Ŷi= 86703.7 + 43.72 Xi (2.16) *	0.21	4.7*	1036.14	4.22
Exports	8	Ŷi= 15441.16 + 7.72 Xi (6.26) **	0.68	39.21**	86.8	8.9

Whereas:
i = denotes the estimated value of the dependent variable in year Ŷi
Xi = denotes the time as an independent variable in year I, where I = (20,……., 3, 2, 1).
Numbers in parentheses below the estimates denote the calculated (t) value.
** denotes significance at (0.01), * indicates significance at (0.05) level.
Source: It was collected and computed from the data mentioned in Table (1).

Second: Estimating the strategic stock and food security factor of edible oils in Egypt:

The volume of the strategic reserve of edible oils in Egypt:

By estimating the size of the surplus and deficit of edible oils for domestic consumption during the period (2000-2019), and the review of the data contained in Table (3) revealed the following:

1- It turns out that the period of coverage of local production for consumption of edible oils during the study period (2000-2019) fluctuated between a minimum of about 37.36 days, or about (1.24 months) in 2015, and a maximum of about 125.18 days, or about (4.2 months). In 2002, while the average period was about 66.71 days, or about (2.22 months), and for the period of coverage of imports for local consumption of edible oils during the study period, it became clear that they fluctuated between a minimum of about 190.50 days, or about (6.35 months). In 2003, it reached a maximum of about 372.43 days, or about (12.41 months) in 2014, while the average period for covering the amount of imports for local consumption was about 302.65 days, or about (10.09 months). From the above it is evident that the period of coverage of the amount of imports for local consumption decreases and the period of adequacy of local production for local consumption of edible vegetable oils decreases, and this is considered a not good indicator for the Egyptian economy, which indicates a decrease in food security from edible vegetable oils in Egypt because it leads to increased dependence on the outside in meeting Domestic needs of edible vegetable oils, thus increasing the balance of payments deficit.

2 - It was also found that there was a surplus of edible oils over domestic consumption due to imports during the years (2000, 2001, 2002, 2004, 2005, 2006, 2007, 2011, 2013, 2014, 2015, 2016, 2017, 2018), where the total volume of this The surplus of about 1213.98 thousand tons is sufficient to consume approximately 329.86 days, or about (10.9 months).

This surplus is directed to developing the strategic stock of edible oils to be withdrawn during the years in which a deficit appears in the oils intended for local consumption.

3- While it was found that there was a deficit in edible vegetable oils during the rest of the other years during the period (2000-2019 AD), where the total deficit was estimated at about 785.73 thousand tons, with a deficit period estimated at about 242.5 days, or about (8.1 months), and this deficit is covered from Through the withdrawal of strategic stocks and imports from abroad.

4 - The increase in the amount of deficit or withdrawal from the strategic stock of food oils over the amount of the surplus from that stock and then the ratio of the amount of deficit to the surplus amounted to about 64.72% at the end of the study period, and according to the concept of the strategic stock as the result of both the surplus and deficit during the study period Where the strategic reserve of edible oils in Egypt was estimated at 428.25 thousand tons, sufficient to cover domestic consumption for a period of about 87.36 days, or about (2.91 months). This indicates that there is no appropriate strategic stock of edible oils in Egypt, due to the amount of The deficit is greater than the amount of the surplus, which requires the state to work to provide a strategic stock of edible oils to achieve the concept of food security.

5- In light of both the strategic reserves and the average domestic consumption of edible oils, which amounted to about 428.25 and 1175.5 thousand tons, respectively, the food security factor for edible oils in Egypt is estimated at 0.36 during the study period, indicating the relative increase in the amount of the food security factor for vegetable oils. The rationale for this is the amount of imports and not the domestic production of oils. Therefore, it is necessary to work on increasing the food security factor of edible oils by expanding the cultivation of oil crops, in order to create an accumulation in the strategic stocks sufficient for local consumption to achieve food security from food oils in Egypt. Consequently, it is required to increase the strategic oil reserve for domestic consumption for a period of not less than 6 months as a kind of food security consideration.

Table (3) Evolution of the indicators of the production adequacy periods, the coverage of imports and the amount of surplus and deficit in edible oils intended for domestic consumption in Egypt during the period (2000-2019).

Year	**Daily Consumption (thousand tons)**	**Sufficiency period of production for consumption per day**	**The period of import coverage for consumption per day**	**The sum of the two shifts per day**	**Surplus or deficit**		**Value of the food security factor ****
					Quantity (thousand tons)	**The adequacy period of the surplus and the deficit in domestic consumption per day**	
2000	2.05	56.1	316.51	372.61	15.60	7.61	0.021
2001	1.57	77.07	300.13	377.2	19.15	12.20	0.033
2002	1.35	125.18	258.14	383.32	24.73	18.32	0.050
2003	1.39	97.12	190.50	287.62	- 107.55	77.38	(-0.21)
2004	2.74	55.11	320.22	375.33	28.30	10.33	0.028
2005	3.42	59.65	313.04	372.69	26.29	7.69	0.021
2006	3.81	54.33	316.68	371.01	22.89	6.01	0.016
2007	2.15	115.35	269.86	385.21	43.45	20.21	0.055
2008	2.02	86.63	254.62	341.25	- 47.97	23.75	(-0.065)
2009	1.96	89.79	257.27	347.06	- 35.16	17.94	(-0.049)
2010	1.84	94.56	256.22	350.78	- 26.16	14.22	(-0.038)
2011	3.48	57.47	348.25	405.72	141.70	40.72	0.111
2012	3.99	44.11	305.49	349.6	-61.44	15.40	(-0.042)
2013	4.19	54.41	365.82	420.23	231.41	55.23	0.151
2014	3.63	54.82	372.43	427.25	225.96	62.25	0.170
2015	4.39	37.36	341.98	379.34	62.1	14.34	0.039
2016	4.74	37.76	357.17	394.93	141.86	29.93	0.082
2017	4.80	38.33	344.44	382.8	85.44	17.8	0.048
2018	5.33	48.6	343.62	392.22	145.1	27.22	0.074
2019	5.41	50.46	220.71	271.2	-507.45	93.8	(-0.256)
Average	3.21	**Strategic Reserves = 428.25 Food security factor= 0.36**					

** The value of the food security factor = (the amount of surplus or deficit / the amount of domestic consumption)
Source: Calculated from the data of Table No. (1).

Thirdly: The economic factors affecting the food security factor for edible oils in Egypt:

With regard to analyzing the impact of the most important factors that are supposed to have an impact on the food security factor of edible oils as a dependent variable and the most important economic factors that can be considered with an indirect effect on them as independent variables which are population in million people (x_1), exchange rate (x_2), investment Agricultural prices are in billions of dollars (x_3), total national income in billion dollars (x_4), the import price in dollars per ton (x_5), excluding the variables that have a direct impact on the food security factor for edible oils, which are the quantity of production, the amount of imports, the quantity of exports, and the amount of consumption of edible oils This is because they are variables that are directly included in the calculations of the food security factor.

In this part, several tests will be performed before estimating the regression model, namely (unit root test, cointegration test, causality test) and then estimating the standard of the regression model as follows:

1 - Unit root test results:

By reviewing the data of Table (4) related to the unit root tests (Extended Dicke Fuller Test (ADF)), we note that the statistical significance (t) is confirmed at the level of 5% of the food security factor, while the statistical insignificance of the independent variables was revealed as the calculated (t) values decreased. For those variables from the computed values of the critical values at the level, which indicates that these variables are not stable in the levels, i.e. accept the hypothesis of the existence of the unit root.

Taking the initial differences for the variables used in the estimation, the results of the tests (Extended Dickey Fuller test, statistical significance (t)) revealed at the level of significance of 5% and some at 1% until all the variables became stable (stationary), i.e. the rejection of the null hypothesis with the presence of a unit root and this result is necessary To avoid obtaining spurious results resulting from the use of unstable coefficients, and therefore it can be concluded that time series are non-static-level chains but static difference, and each variable separately is considered integral in the first degree as long as the first difference for each of them is integral from the zero degree, These results are consistent with the standard theory which assumes that most macroeconomic variables are non-static in the level, but become static in the first difference.

The calculated value of the critical values at the significant level was 1%, 5%, 10%, about 4.53, 3.67, 3.27, respectively, and it is smaller than the critical value at the first difference of about 4.57, 3.69, 3.28, respectively, i.e., the hypothesis of the existence of the unit root is not accepted.

Table (4) Unit root test using Augmented Dickey-Fuller (ADF) tests.

Variables		**ADF**	
		levels	**1st. Differences**
Food security factory		-3.8189 (0)**	-6.9871 (0)***
Population(x1)		-1.63701 (4)	-4.7963 (4)***
Exchange Rate(x2)		-1.9658 (0)	-3.3278 (0)*
Agricultural investment(x3)		-2.5740 (0)	-4.4316 (0)**
National income(x4)		-1.3677 (0)	-4.1616 (4)**
Import price(x5)		-1.4855 (0)	-4.0668 (0)**
Test critical values:	1% level	-4.532598	-4.571559
	5% level	-3.673616	-3.690814
	10% level	-3.277364	-3.286909

*** Significance at the level of 1%, according to the table values of (MacKinnon: 1996).
** Significant at the level of 5% according to the table values of (MacKinnon: 1996).
* Significance at the level of 10% according to the table values of (MacKinnon: 1996).
() The length of the automatic slowdown period according to (Schwartz Info Criterion), up to a maximum of 4 periods.
Source: Calculated from the data of Table (1) in the Appendix and using the econometrics package E-views 6.

2 - Results of the cointegration test using the Johansson Cointegration Test):

By reviewing the results of the joint integration test in Table (5) between the food security factor for edible oils, and the explanatory variables (population, exchange rate, agricultural investment, national income, import price). It was found from the impact test that the calculated value of the effect test reached (237.76) at the level of significance of 5%, and therefore we reject the assumption of the null saying that there is no vector for the co-integration in the model, as it is evident from the impact test that there are five vectors for common integration between the model variables at each level of significance 5%, 10%, as it is evident from the test of the greatest eigenvalue that the computed value of the greatest potential ratio reached (95.89) at the level of significance of 5%. Therefore, we reject the assumption of the null saying that there is no vector for the covariant integration in the model and through the results in the table it becomes clear that there are five cointegration vectors The participant is at a significance level of 5%, as the calculated value of the greatest likelihood ratio is (4.76), which is greater than the critical value of (4.12), meaning that the null hypothesis that there is no co-integration vector in the model is not accepted.

Table (5): Results of the cointegration test using (Johansson test).

Johansson Cointegration Test (Trace)				
Hypothesized (No. of CE (s))	**Eigen value**	**Trace Statistic**	**Critical Value 5%**	**Prob.****
(None*)	0.995144	237.7609	83.93712	0.0000
(At most 1*)	0.971371	141.8649	60.06141	0.0000
(At most 2*)	0.847251	77.90456	40.17493	0.0000
(At most 3*)	0.705569	44.08325	24.27596	0.0001
(At most 4)	0.617834	22.07448	12.32090	0.0009
(At most 5*)	0.232379	4.760267	4.129906	0.0346
Trace test indicates 6 cointegrating eqn (s) at the 0.05 level				
*** denotes rejection of the hypothesis at the 0.05 level**				
****MacKinnon-Haug-Michelis (1999) p-values**				
Johansson Cointegration Test (Maximum Eigen value)				
Hypothesized No. of CE (s)	**Eigen value**	**Max-Eigen Statistic**	**Critical Value 5%**	**Prob.****
(None *)	0.995144	95.89598	36.63019	0.0000
(At most 1*)	0.971371	63.96030	30.43961	0.0000
(At most 2 *)	0.847251	33.82131	24.15921	0.0018
(At most 3*)	0.705569	22.00877	17.79730	0.0109
(At most 4)	0.617834	17.31421	11.22480	0.0038
(At most 5*)	0.232379	4.760267	4.129906	0.0346
Max-eigenvalue test indicates 4 cointegrating eqn (s) at the 0.05 level				
*** denotes rejection of the hypothesis at the 0.05 level**				
****MacKinnon-Haug-Michelis (1999) p-values**				

Source: Calculated from the data of Table (1) in the Appendix and using the econometrics package E-views 6.

3 - Causality test results:

After achieving the stationary test and the cointegration test, and before starting to estimate the (Tobit) regression model, it must be ensured that there is a causal relationship between the independent variables and the dependent variable. The Granger Causality Test was used to test the causality and the results were as shown in Table (6) Where the results indicate that the result of the causation test was significant at the level of 5% and another at the level of 1%, and thus we reject the null hypothesis that states that there is no causal relationship between the independent variables (population X_1, exchange rate X_2, agricultural investment X_3, national income X_4, import price X_5) And the dependent variable (the food security factor for edible oils Y), and we conclude that changes in these independent variables cause fundamental changes in the food security factor for food oils Y, while the significance of the causal relationship between each of the two independent variables did not appear (agricultural investment X_3, import price X_5) And the dependent variable (the food security factor for edible oils Y), unless this test is performed at 5 lag periods for that variable.

Table (6) Pairwise Granger Causality Tests on the number of lags (2)

Null Hypothesis:	Obs	F-Statistic	Prob.
X1 does not Granger Cause Y	18	0.10018	0.9054
Y does not Granger Cause X1		4.41044	0.0345
X2 does not Granger Cause Y	18	0.63646	0.5449
Y does not Granger Cause X2		16.0607	0.0003
X3 does not Granger Cause Y	18	0.25250	0.7806
Y does not Granger Cause X3		0.39342	0.6825
X4 does not Granger Cause Y	18	2.14736	0.1564
Y does not Granger Cause X4		5.98731	0.0144
X5 does not Granger Cause Y	18	0.38325	0.6891
Y does not Granger Cause X5		0.57691	0.5754

*** Significant at 1% level ** significant at 5% level * significant at 10% level

Source: Calculated from the data of Table (1) in the Appendix and using the econometrics package E-views 6.

4 - Results of the Tobit Model estimation:

By conducting the multiple regression analysis in the linear form using the Tobit Model method, it is clear from Table (7) the following:

1 - Population (x_1):

There is no doubt that the increase in the population is linked to an increase in the demand for food, including edible oils and the consequent imbalance between supply and demand for edible oils, and thus the negative impact on food security.

Table (1) in the appendix shows an increase in the population of Egypt from 63.97 million people in 2000 to 99.80 million people in 2019. The increase amounted to about 56.01% in 2019 for the year 2019 AD, with a general average of 79.33 million people during the period (2000 - 2019).

The results of the model estimated in Table (7) indicate that an increase in the population by one million people leads to a decrease in the food security factor for edible oils by about 0.132 units, and the significant effect of the population on the food security factor for edible oils has been proven at a statistical significance level of 1%. Regression Coefficient and Economic Reasoning.

2 - Exchange rate (x_2):

The exchange rate tool is one of the most important monetary policy tools for any national economy, so a higher exchange rate means a decrease in the value of the local currency relative to the foreign currency and vice versa. Perhaps it is known that the demand for foreign currency increases due to the import of goods and services from abroad, and then the burden on the balance of payments for the state increases, and price policies, especially agricultural prices, interact with all economic factors and influences, whether at the total or partial level, as agricultural prices and food prices affect the price Drainage, especially with regard to imported food.

It is clear from Table No. (1) in the appendix that the exchange rate increased from 3.5 pounds in 2000 to 16.80 pounds in 2019, and the increase amounted to about 380% in 2019 compared to the year 2000, with an average of 7.86 pounds during the period (2000-2019).

The results of the model estimated in Table (7) indicate that an increase in the exchange rate by one pound leads to an increase in the food security factor for edible oils by about 0.048 units, while the significance of the effect of the exchange rate on the food security factor for edible oils has not been proven at a statistical significance level of 10%. Indicates that the positive sign of the regression coefficient does not agree with economic logic.

3 - Agricultural Investment (x_3):

Agricultural investment is the main engine and the driver for sustainable agricultural development and thus food security, as narrowing the gap between production and consumption and raising the efficiency of utilizing available resources, and it also leads to the establishment of new projects that develop the productive and human capacity, which leads to an increase in income growth rates and economic prosperity.

Table (1) in the appendix shows the decrease in the value of agricultural investment from $ 2.322 billion in 2000 AD to $ 1.777 billion in 2019 AD. The amount of the decrease was about 30.7% in 2019 for the year 2000, with an average of $ 1.431 billion during the period (2000-2019).

The results of the model estimated in Table (7) indicate that an increase in investment in the agricultural sector by one billion dollars leads to an increase in the food security factor for edible oils by about 0.0181 units. The significance of the impact of agricultural investment on the food security factor for edible oils has been proven at a statistical significance level of 1%. The indication of the regression coefficient and the economic logic also agreed.

Table (7) the results of the Tobit regression model estimation of the food security factor for vegetable oils on the most important economic variables affecting them during the period (2000-2019).

variables	Coefficient	Std. Error	z-Statistic	Prob.
C	0.204721	0.057375	3.568158	0.0004
D (X1)	-0.132041	0.035657	-3.703086	0.0002
D (X2)	0.048039	0.032647	1.471467	0.9739
D (X3)	0.181784	0.064880	2.801863	0.0051
D (X4)	0.002138	0.000971	2.201592	0.0277
D (X5)	-9.51E-05	2.68E-05	-3.547172	0.0004
	Error Distribution			
SCALE:C (7)	0.029295	0.005761	5.085316	0.0000
Mean dependent var	-0.001042	S.D. dependent var		0.092862
Akaike info criterion	-2.307522	Schwarz criterion		-1.959571
Log likelihood	28.92146	Hannan-Quinn criter.		-2.248635
Avg. log likelihood	1.522182			

Source: Calculated from the data of Table (1) in the Appendix and using the econometrics package E-views 11.

4 - Gross National Income (x4):

The national income is an important indicator because it reflects the general picture of the balance of the state's economic system, and the importance of the national income of the state is the concerted efforts in food production to achieve appropriate levels of food security for members of society. Therefore, the importance of studying the relationship between national income and the food security factor of edible oils.

It is clear from Table. (1) in the appendix that the value of the national income increased from 100.30 billion dollars in 2000 to 292.1 billion dollars in 2019, and the increase amounted to about 67.31% in 2000 for the year 2019, and an average of $ 191.96 billion during the period (2000 - 2019).

The results of the model estimated in Table (7) indicate that an increase in the national income by one billion dollars leads to an increase in the food security factor for edible oils by about 0.002 units. The significant impact of the national income on the food security factor for edible oils has been proven at a statistical significance level of 5%, as agreed Indication of the regression coefficient and economic logic.

5 - Import price (x5):

Some researchers believe that it is not necessary to achieve food security only by relying on local food production, but rather with the state's ability to provide the financial resources necessary to import its food needs. Among the pillars of food security is the global trade movement and contact with global markets and foreign trade relations, so the importance of studying the impact of this variable (import price) affects the food security factor for edible oils in Egypt.

It is clear from Table No. (1) in the appendix that the import price increased from 419.8 dollars / ton in 2000 to 1009.8 dollars / ton in 2019, and the increase amounted to about 140.54% in 2019 for the year 2000 AD, with an average of 972.02 dollars / ton during the period (2000 - 2019).

The results of the model estimated in Table (7) indicate that an increase in the import price by one dollar leads to a decrease in the food security factor for edible oils by about 0.000951 units, and the significant impact of the national income on the food security factor for edible oils has been proven at a level of statistical significance of 1%. The regression coefficient and economic logic signal agreed.

The value reflects the total elasticity, which amounted to about 0.0854, which means that increasing the variables under study referred to by 10%, but rather increasing the food security factor by about 0.854%.

The estimated model is efficient, as the mean values of the error distribution of the dependent variable S.D. dependent var of 0.092, Schwarz criterion value of -1.95.

Summary and recommendations:

Oil crops are the main source of edible oils, which are one of the strategic commodities in Egypt.

Achieving Egyptian food security is one of the necessary things that must be relied upon from sustainable local production sources. This requires increased attention to increasing local production of edible oils. The rate of self-sufficiency of vegetable oils in Egypt is estimated at 18.25%, and the food security factor for edible oils is estimated in Egypt averages 0.36 for the period (2000-2019). The research problem is that there is a gap between the production of edible oils and consumption in Egypt, and then this gap causes a burden on the Egyptian trade balance, where the average quantity of edible oils is about 186.85 thousand tons and the average amount of consumption is about 1175.85 thousand tons, thus reaching an average The amount of the gap is about 986.15 thousand tons during the same period This study aimed to identify the economic dimension of the food security policy for edible oils in Egypt during the period (2000-2019) by studying the current status of the production and consumption of edible oils in Egypt and assessing the strategic stock and food security factor for edible oils And the study of the economic factors affecting the food security factor of edible oils during this period.

To achieve the objectives of the study, econometric analysis was used by performing multiple regression analysis in the linear image using the (finite dependent variable model) Tobit Model, and performing unit root tests, common integration, causation test, in addition to descriptive analysis.

By studying the current situation of food security, it was found that the quantity of strategic reserves of food oils amounted to about 428.25 thousand tons. Domestic consumption is sufficient for a period of 87.36 days, or about (2.91 months). The value of the food security factor during the study period was about 0.36.

According to the unconventional analysis method known as the Tobit model to measure the impact of the most important economic factors that are supposed to have an indirect impact on the food security factor of edible oils, the most important of which are the population, the exchange rate, agricultural investment, national income, import price with the exclusion of variables related. The direct impact on the food security factor for edible oils, which is the amount of production, the amount of imports, the quantity of exports, and the amount of consumption of edible oils, because they are variables that enter directly into the calculations of the food security factor.

The significance of the effect of these factors was proven, except for the exchange rate variable. The significance of the regression coefficients was not proven, in addition to matching the signs of the regression coefficients for the independent variables to the assumptions of economic theory, and reflecting the value of total elasticity, which amounted to about 0.0854, meaning that the increase in the variables under study referred to by 10%, It increases the food security factor by 0.854%.

The study recommends the necessity to increase the food security factor for edible oils from 0.36 to 0.50 according to food security considerations, and in order to create an appropriate strategic stock sufficient for domestic consumption for at least six months, by adopting some policies, the most important of which are the following:

1. Raising awareness of rationalizing the consumption of edible oils so that the nutritional gap of these oils does not worsen through the package of programs and support measures undertaken by the state.
2. Following fiscal policies that increase national income to ensure food security from food oils for all members of society.
3. Expanding the cultivation of some oil crops suitable for cultivation in desert lands and new lands to extract high quality edible oils.
4. Working to increase agricultural investment in order to reduce the deficit in the trade balance due to its positive impact on increasing the food security factor for food oils in Egypt.
5. Development of scientific research to raise the productivity of oil crops, in a way that contributes to increasing their production.
6. Working to find other non-traditional sources for producing oils locally, in order to increase the strategic reserve to reduce import risks in light of global fluctuations in prices and supply of edible oils.

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Appendices

Table No. (1) The evolution of the value of exports, imports, agricultural trade balance, population, exchange rate for the dollar, value of agricultural investments, average price of import of edible oils and The gross national income during the period (2000-2019).

Year	Value of edible oils exports (million dollars)	The value of imports of edible oils (in million dollars)	Agricultural Trade Balance of Value Food Oils (minus)	Population (million people)	Exchange Rate	Agricultural investment value (billion dollars)	Average import price of vegetable oils (US $ / ton)	Total national income (billion dollars)
2000	23.69	272.37	248.68	63.97	3.50	2.322857	419.8	100.3055
2001	17.78	162.03	144.25	65.29	4.00	2.05	343.9	97.75614
2002	14.17	167.92	153.75	66.62	5.97	1.606365	481.9	85.24187
2003	21.94	144.52	122.58	67.96	6.27	1.020734	545.8	80.18126
2004	22.68	356.32	333.64	69.30	5.79	1.305699	406.1	78.57577
2005	21.49	449.07	427.58	70.65	5.79	1.28152	419.5	89.34687
2006	14.51	476.57	462.06	72.01	5.75	1.398261	395.00	107.9568
2007	11.45	363.48	352.03	73.64	5.79	1.345423	626.5	131.6148
2008	149.1	1080.9	931.81	75.19	5.45	1.480734	2101.5	164.1779
2009	166.4	825.91	659.53	76.92	5.76	1.190972	1637.9	189.3006
2010	123.5	2282.2	2158.6	78.68	5.67	1.188713	2178.7	214.619
2011	237.4	2044.9	1807.5	80.53	5.97	1.144054	1687.3	229.9402
2012	239.8	1872.3	1632.6	82.30	6.10	0.880328	1536.00	272.6373
2013	245.5	1614.1	1368.5	84.62	6.88	1.218023	1053.1	281.0277
2014	177.4	1480.7	1303.3	86.81	7.09	1.640339	1095.3	298.3327
2015	103.6	1617.8	1514.2	88.95	8.78	1.527335	1077.6	323.6657
2016	156.40	1429.27	1272.87	91.02	10.20	1.596078	844.2	327.97
2017	282.3	1390.16	1107.86	95.20	17.85	1.22465	840.8	231.1652
2018	205.1	1354.8	1149.7	97.14	17.88	1.433632	739.7	243.4334
2019	324.8	1205.70	880.9	99.80	16.80	1.777282	1009.8	292.0827
Average	127.95	1029.55	901.6	79.33	7.86	1.43	972.02	191.96

Source: Data collected and calculated from the Ministry of Agriculture and Land Reclamation, Economic Affairs Sector, Foreign Trade Bulletin, various issues.
- The World Bank website www.data.albankaldawli.org/country/egypt

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