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COMPETITIVENESS OF EGYPTIAN ONION EXPORTS TO THE MOST IMPORTANT EUROPEAN UNION COUNTRIES

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Abstract

This research deals with the study of the competitiveness of Egyptian exports onions to the most important EU markets by calculating some measures of competitiveness of Egyptian onion crop exports (Market Share Index, Market Penetration Rate, Price Ratio Index, Geographical Concentration Index and Composite Competitiveness Index) for the most important EU countries during the period (2008-2018), it also examines the most important factors affecting the external demand for Egyptian onion exports to the most important EU countries during the average period (2008-2017). The research also deals with the standard estimation of the desired and targeted level of Egyptian onion exports to EU countries. The study of the development of Egyptian agricultural exports to the European Union countries showed a tendency to increase at an increasing rate of 8.2%, while the quantity and value of Egyptian onion exports increased at an increasing rate of 11% and 6.5% during the period (2000-2018). The results of the measurement of the impact of the January 2011 revolution on the value of total and agricultural exports of the European Union bloc and the total Egyptian exports of onions by measuring the rate of change between the two periods which are (Before and after the revolution 2011 in Egypt).

The results of the standard estimation of the desired and targeted level of Egyptian onion exports to the most important EU countries using the Nerlove's partial adjustment model showed that the most important determinants of the Egyptian onion exports to the EU countries.

Key words: Onion Export Competitiveness, Market Share Index, Market Penetration Rate, Price Ratio Index.

Introduction

Perhaps one of the most important problems facing the Egyptian economy is the decline in the country's foreign exchange earnings, which leads to the failure to achieve development goals, there is no doubt that the direction of the general policy of the State to correct the imbalance in the overall trade balance, especially in the agricultural balance to develop agricultural exports where they open new foreign markets under the benefit of the advantages of intra-regional trade with different economic unions may lead to improved terms of trade under international competition for commodity exports. The European Union is one of the most important economic unions as a means of trade and agricultural exchange with Egypt, where the total exports of the EU countries accounted for about 27.6% of the total value of total exports of Egypt exports totaling about 26.76 billion dollars USD during the average period (2008-2018). While Italy the United Kingdom, the Netherlands and Germany are among the most important EU countries for Egyptian agricultural exports where the total value of agricultural exports to these countries represented about 70% of the total Egyptian agricultural exports to the EU countries amounting to about $699.9 million during the average period (2008-2018).

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Materials and Method

The research was based on the descriptive and quantitative statistical analysis methods. Some statistical analytical methods were used such as time series analysis Geographical distribution using the Geographical Concentration Index (GCI) and the competitiveness of Egyptian onion exports in the most important European countries were estimated European market through use of some measures of competitiveness such as (market

share index, market penetration rate, price ratio index, composite index of competitiveness). The regression analysis method was used to estimate the external demand functions on the quantity of Egyptian exports of onion crop in the most important European countries to determine the most important and influential economic variables in the external demand for Egyptian onion exports in these countries was also used. The least squares method was used to estimate the features of functions: 1. the compatibility of function coefficients signals with economic logic, 2. the significance of function coefficients with statistical logic through the test (t), 3. the significance of the effect of independent variables combined on the dependent variable through the test (F). The DW Watson test was also used to detect whether there was a self-correlation. In addition to use Nerlove's partial Adjustment Model to estimate the desired and targeted level of Egyptian onion exports in the most important European countries. The study relied on secondary data published in several official bodies such as the Ministry of Agriculture and Land Reclamation, foreign trade bulletins issued by the Central Agency for Public Mobilization and Statistics, in addition to the Central Agency for Public Mobilization and Statistics database on the website and the FAO database and the database of the United Nations foreign trade, as well as the use of some researches, theses, studies and scientific books and Arabic and foreign related to the subject of the study.

Research Problem

One of the most important problems facing the Egyptian economy is the decline in the outcome of the state of foreign exchange. This leads to the failure to achieve development goals, Egypt exports are one of the main sources of foreign exchange, especially deficit in the Egyptian trade balance, which amounted to about 51.31 billion dollars in 2018 while the onion crop is considered one of the most important agricultural export crops in Egypt, where the value of exports of onion crop about $116.54 million in 2018, where the United Kingdom, the Netherlands, Italy and Germany are the most important EU countries importing Egyptian onion crops. The total value of onion exports to these countries about 24.2 million dollars, representing about 13.4% of the total Egyptian onion exports of about 180.3 million dollars during the average period (2008-2018). However, despite the competitiveness of Egypt in the production and export of onions, the quantity of Egyptian exports of onion has declined from about 1219.1 thousand tons in 2015 to about 444.7 thousand tons in 2018, a decrease of about 774 thousand tons, representing about 64% of its quantity in 2015, which necessitated the study of the competitiveness of the Egyptian onion crop in the most important European countries.

Aim of the Research

The research aims to study the competitiveness of Egyptian onion exports to the most important EU countries by studying the following:

1. The impact of the revolution (25 January 2011) on the total exports, agricultural exports and agricultural exports to the EU bloc market and the total Egyptian exports of onions by measuring the rate of change between the two periods (before and after the revolution).

2. Development of the value of agricultural exports of the European Union bloc during the period (2008-2018).

3. Evolution of the total quantity and value of Egyptian onion exports during the period (2008-2018).

4. Geographical distribution of onion crop for the most important foreign markets during the period (2008-2018).

5. Competitiveness of onion crop exports in the most important EU countries by calculating some competitiveness indicators (market share index, market penetration rate, price ratio index, composite index of competitiveness).

6. Determinants of the external demand functions of Egyptian onion exports in the most important EU countries (UK, Netherlands, Italy, Germany) during the period (2008-2017) through the standard estimation of external demand functions on Egyptian onion exports in those European markets.

7. A standard estimate of the desired and targeted level of Egyptian onion exports to the most important EU countries using the Nerolov partial adjustment model.

8. Predicting the Egyptian onion exports to the most important EU countries till 2023.

Results

1. The study showed that the value of the geographic concentration coefficient of the Egyptian exports onions amounted to about 0.48, which reflects that importation foreign markets for the Egyptian Exported onion crop was limited during the average period, therefore we must work to open other new markets to benefit from the EU agreement.

2. The market share index value of Egyptian exports onions to the most important European countries shows an increase for the United Kingdom, the Netherlands and Italy, while the to Germany market were decrease.

3. It was found that the Egyptian onion crop had a

Table 1: Evolution of the total value of total and agricultural exports and agricultural exports of the EU bloc and onion exports during the average period (2000-2018) (Value: US $ million - Quantity: Thousand tons)

Years	Total Exports	Agricultural Exports	Agricultural Exports to European Union	Exports of onions	
				Values	Quantity
2000	4699	509	157.3	147.8	12.4
2001	4143	530	161.6	166.4	14.2
2002	4678	671	198.0	293.4	23.6
2003	6166	776	210.0	320.2	33.0
2004	7678	1105	320.0	328.0	33.7
2005	10643	918	273.4	300.9	30.9
2006	13715	855	274.6	204.7	23.8
2007	16180	1203	363.4	201.2	36.0
2008	26258	2090	556.1	246.4	97.1
2009	24206	2968	656.8	234.7	168.3
2010	27359	3131	615.6	512.3	227.2
Average (2000-2010)	**1348**	**1341**	**344.3**	**268.7**	**63.7**
2011	31550	3026	671.3	290.8	215.4
2012	29264	2684	607.0	347.7	154.2
2013	28696	2867	687.5	371.7	201.8
2014	27542	2953	796.8	366.9	168.5
2015	21340	2852	720.1	1219.1	263.5
2016	22580	2697	778.2	441.4	197.3
2017	26397	2802	821.2	566.2	206.7
2018	29215	2792	787.8	444.7	116.5
Average period (2018-2011)	**27073**	**2834**	**733.7**	**531.1**	**190.5**
Overall average	**19069**	**1970**	**508.3**	**379.2**	**117.1**
Measure the impact change between the two periods	**104.4**	**111.3**	**113.1**	**97.6**	**199.2**

Source: Compiled and calculated from

low penetration rate for Germany market so, we need to benefit from the experiences of competing countries in the export of the most important agricultural crops.

4. It is very important of having sufficient data for Egyptian exporters on foreign markets, especially European market and encouraging studies that study the external demand for Egyptian agricultural exports.

5. Directing agricultural policies towards expanding the cultivation and production of onions to increase of Egyptian exports from it. Also the results show the amount of crop forecasting Egyptian onion exports to the most important EU countries until the year 2023 that is expected to decrease the amount of Egyptian onion exports.

Discussion

First: The evolution of the general time trend of the study variables during the period (2000-2018).

The review of the data table 1, that the total value of total exports amounted to about 13.25 billion dollars over the average pre-revolutionary period (2000-2010), While it increased to about 27.07 billion dollars during the average period after the revolution (2011-2018), the rate of change between the periods before and after the revolution was about 104.4%. This indicates the positive impact of the revolution on increasing the total value of total exports, thus reducing the gap in the Egyptian trade balance, while the total value of agricultural exports reached about 1.341 billion dollars during the average period (2000-2010), While it increased to about $2.834 billion during the average period (2011-2018), the rate of change between the periods before and after the revolution was about 111.3% this indicates the positive impact of the revolution on increasing the total value of agricultural exports, thus reducing the gap in the Egyptian agricultural balance.

1. Central Agency for Public Mobilization and Statistics, Foreign Trade Bulletin, various issues.

2. The website of the Central Agency for Public Mobilization and Statistics: www.capmas.gov.eg.

The study of the development of the total value of the total Egyptian exports showed that it increased from about 4.7 billion dollars in 2000 to about 29.2 billion dollars in 2018, an increase representing about 522% of its value in 2000 - table 1. The estimation of the time trend formula for the evolution of the total value of total exports during the period (2000-2018) shows that it has taken a growing trend of statistical significance which reached about $ 1,517.6 million, which represents about 8.0% of the average study period of about $19.07 billion - table 2, While the study of the development of the total value of Egyptian agricultural exports showed that it increased from about 509 million dollars in 2000 to about 2.79 billion dollars in 2018, an increase representing about 449% of its value 2000- table 1. By estimating the time trend formula for the

Table 2: The general time trend for the development of total and agricultural exports Agricultural exports of the EU bloc and total exports onion during the period (2000-2018) (Value: US $ million - Quantity: Thousand tons)

Variable	equation	R^2	F	Average	growth rate
Total exports value	$v_t = 3892.5 + 1517.6 X_t$ (6.87)**	0.735	47.2**	19069	8.0
Total exports value of agricultural	$v_t = 345.9 + 162.4 X_t$ (7.62)**	0.774	58.1**	1970	8.2
The exports value of Egyptian agricultural to the EU bloc	$v_t = 91.03 + 41.7 X_t$ (14.21)**	0.922	201.8**	508.3	8.2
Total Export Value of Onion	$v_t = 11.25 + 12.8 X_t$ (5.95)**	0.675	35.4**	117.1	11.0
Total Exports quantity of Onion	$v_t = 132.67 + 24.65 X_t$ (3.00)**	0.347	9.0**	379.2	6.5

Source: Compiled and calculated from table 1. Significant at a probability level of 0.01. * Significant at a probability level of 0.05**

development of the total value of agricultural exports during the period (2000-2018), it turned out to have taken an increasing statistically significant trend of about $162.4 million this represents about 8.2% of the average study period of about US $1.97 billion (Table 2).

As shown by the study of the evolution of Egyptian agricultural exports to the EU bloc, it has increased from about $157.3 million in 2000 to about 787.8 million dollars in 2018, representing an increase of about 401% of its value in 2008 - table 1 and estimate the time trend of the evolution of Egyptian agricultural exports to the bloc, the European Union during the period equation (2000 - 2018) and the trend were growing up reached about $41.7 million representing 8.2% of the average study period of about $508.3 million table 2.

According to the study of the evolution of the total value of exports of onion crop, it increased from $12.4 million in 2000 to about $116.4 million in 2018, an increase representing about 841% of its value in 2008 - table 1 after estimating the time trend equation of the evolution of the export onion value the general trend has taken an increasing of about $12.8 million Representing about 11% of the average of about $117.1 million table 2, while the study of the evolution of the total exports onion quantity crop, it increased from 147.8 thousand tons in 2000 to about 444.7 thousand tons in 2018, which is representing an increase to 201% of the quantity which done in 2008 from table 1. On the basis of estimating the time trend formula for the development of the exports onion quantity crop, it has taken an increasing general trend of about 24.65 thousand tons representing about 6.5% of the average of about 379.2 thousand tons table 2.

Table 3: The development of Egyptian agricultural exports distributed among the EU bloc in million dollars during the average period (2008-2018)

Country	Value	%
United kingdom	172.89	24.7
Italy	138.53	19.8
Germany	111.41	15.9
Netherlands	66.07	9.4
Belgium	57.82	8.3
Greece	31.03	4.4
France	28.38	4.1
Spain	18.53	2.6
Republic of Slovenia	10.28	1.5
Poland	8.51	1.2
Other countries	56.41	8.1
Total	**699.9**	**100**

Source: Compiled and calculated from:

Second: The geographical distribution of Egyptian onion exports during the period (2008-2018).

Data from table 3 shows that the United Kingdom, the Netherlands, Italy and Germany represented about 70% of the total Egyptian agricultural exports to the EU countries amounting to about $699.9 million during the average period (2008-2018).

1. Central Agency for Public Mobilization and Statistics, Foreign Trade Bulletin, various issues.

2. The website of the Central Agency for Public Mobilization and Statistics: www.capmas.gov.eg

As shown in table 4, the number of imported foreign markets for Egyptian onions is mainly Saudi Arabia, Russian Federation, United Kingdom, Netherlands, United Arab Emirates, Kuwait, Libya, Jordan, Oman, Syria, Lebanon, Italy, Iraq, Romania, India and Bahrain, by studying the geographical distribution of the quantity of Egyptian onion crop exports in the foreign markets during the average period (2008-2018), it was revealed that Saudi Arabia is the first importer market from Egyptian onions with an average quantity of about 38.9 thousand tons representing 31.9% of the total quantity of the Egyptian onion exports quantity to foreign markets amounting to about 122 thousand tons during the average period (2008-2018) while the Russian Federation ranked second with 110.44 thousand tons representing about 23.18%. The Netherlands, Kuwait, the United Arab Emirates, the United Kingdom, Syria, Jordan, Libya, Lebanon, Oman, Iraq, Italy, Romania, India, Bahrain and other countries

Table 4: Geographical Distribution of Onion Exports in Foreign Markets During the Average Period (2008-2018)

Country	Quantity of exports onion (Thousand tons)	%	Value of exports onion (Million dollars)	%	Export price (USD / ton)
Saudi	194.24	40.77	84.34	46.77	434.1
United Russia	110.44	23.18	20.62	11.44	186.7
United kingdom	14.41	3.02	10.76	5.97	746.5
Netherlands	21.65	4.54	10.03	5.56	463.3
UAE	16.20	3.40	8.50	4.72	524.8
Kuwait	20.93	4.39	7.37	4.08	351.8
Libya	10.27	2.16	4.58	2.54	445.7
Jordan	12.13	2.55	4.40	2.44	362.6
Oman	7.57	1.59	4.17	2.31	550.4
Syria	12.20	2.56	3.63	2.01	297.5
Lebanon	9.64	2.02	3.47	1.92	359.7
Italy	5.46	1.15	2.49	1.38	455.7
Iraq	6.08	1.28	2.38	1.32	390.8
Romania	4.93	1.03	1.60	0.89	324.4
India	3.31	0.69	1.55	0.86	468.0
Bahrain	2.42	0.51	1.21	0.67	499.5
Other	24.6	5.16	9.2	5.11	375.1
Total	**476.5**	**100.00**	**180.3**	**100**	**425.7**
Geographic concentration coefficient	**0.48**		**0.50**	**-**	**-**

Source: Compiled from: 1- Central Agency for Public Mobilization and Statistics website: www.capmas.gov.eg.

other percentages were about 4.54%, 4.39%, 3.4%, 3.02%, 2.56%, 2.55%, 2.16%, 2.02%, 1.59%, 1.28%, 1.15%, 1.03%, 0.69%, 0.51% and 5.16% respectively. Of the total exports quantity of Egyptian onion for the external markets during the average period (2008-2018). It was also found that the average export price of Egyptian onions ranged from a minimum of about 186.7 USD/ton to the Russian Federation and a maximum of about 746.5 USD/ton United Kingdom, while the average export price of Egyptian onions reached about $425.7/ ton over the average study period table 4.

Table 5: Evolution of onion market share index for the most important European countries during the period (2008-2018).

Years	UK	Netherland	Italy	Germany
2008	1.88	4.40	3.29	0.47
2009	3.01	5.19	4.44	0.26
2010	1.53	5.21	9.55	0.15
2011	1.91	5.42	4.28	0.26
2012	2.83	5.61	4.49	0.26
2013	1.93	7.90	6.36	0.44
2014	4.65	7.94	8.23	0.74
2015	3.03	11.31	7.33	0.80
2016	3.21	13.38	7.79	0.84
2017	5.88	21.16	16.87	1.14
2018	5.84	14.65	6.51	0.86
Average	**2.94**	**8.16**	**6.50**	**0.47**

Source: Compiled and calculated from reference data (1), (2)

The geographical concentration of exports Egyptian onion was calculated using Gini-Hirschmann coefficient. Where the value of the index ranges from zero to the right one and when the coefficient value closer to the correct one, this indicates the distribution of exports to a few foreign markets. If the value is close to zero indicates that the expansion and diversification of imported commodity markets, shown from table 4 the value of the geographical concentration coefficient of the quantity and value of Egyptian exports of onion crop was about 0.48 and 0.50 respectively Thus, the geographical concentration factor is relatively high, which reflects the limited external markets imported for the Egyptian onion crop during the average period (2008-2018).

2. Website of the Foreign Trade Map www.trademap.org

Third: Competitiveness Indicators for Exports Egyptian Onion Crop in European Countries Major:

This section deals with measuring the competitiveness of Egyptian exports of onion crop in the most important European countries by calculating the competitiveness indicators which include that (Market Share Index, Market Penetration Index, Price Ratio Index, Composite Competitiveness Index).

1. Market share index of Egyptian onion exports in the most important European countries during the period

Table 6: Evolution of the market penetration rate of onion crop for the most important European countries during (2008-2018).

Years	UK	Netherland	Italy	Germany
2008	1.56	5.38	1.01	0.26
2009	1.19	2.22	0.56	0.08
2010	1.50	76.76	2.97	0.11
2011	1.75	16.23	0.97	0.19
2012	1.70	12.01	1.24	0.12
2013	2.31	33.26	1.50	0.37
2014	3.38	257.43	1.46	0.42
2015	2.95	20.66	1.30	0.32
2016	1.32	40.04	1.37	0.23
2017	1.62	8.61	1.05	0.14
2018	2.06	7.54	0.84	0.10
Average	1.84	18.4	1.19	0.18

Source: Compiled and calculated from reference data (1), (2)

(2008-2018): The market share index is calculated by dividing the value of a country's exports from a given commodity by the total value of world exports of the commodity, the market share index reflects the presence of the exporting country in foreign markets.

Table 5, shows that the average market share index of Egyptian exports of onion crop during the period (2008-2018) has increased from 2008 to 2018 by an increase of about 211%, 233%, 98.1% and 83.4% for the countries markets respectively United Kingdom, Netherlands, Italy, Germany, this indicates an increase in the market share of exports Egyptian onion in European countries, ranging from an upper limit of 8.16% for the Netherlands market and a minimum of 0.47% for the German market during the study period (2008-2018).

2. Market Penetration Indicator for Egyptian Onion Exports in Major European Markets during the Period (2008-2018): This indicator measures the ability of the crop or a particular commodity to penetrate certain export markets when the value of the market penetration indicator Turn to higher, it means that the market is more acceptable to the commodity this means that this crop is more able to penetrate the market under study and is measured by the following equation:

$MPR_{ij} = [M_{ijt} /(Q_{ij} + M_{ij} - X_{ij})]$

Where:

M_{ijt}: Represents the imports quantity of the country i from crop j from a particular country..

M_{ij}: Represents the imports quantity of the country i of crop j

Q_{ij}: represents Quantity of crop production j in country i

X_{ij}: represents the export amount of crop j by country i

$$*C_{jx} = 100\sqrt{\sum \frac{(X_{sj})^2}{(X_i)^2}}$$

C_{jx}: represents the coefficient of geographical concentration of the quantity and value of Egyptian exports of the crop.

X_{sj}: represents the quantity or value of Egyptian exports of the crop destined for a particular country.

X_i: represents the total quantity or value of Egyptian exports of the crop.

It is clear from table 6 that the Netherlands market is the largest market penetrated by Egyptian onions. It was about 18.4% on average and UK market with about 1.84%. Then the market of Italy by about 1.19%, followed by Germany market by about 0.18%. The market penetration index of the onion crop in the EU countries increased from 2008 to 2018, by an increase of about 31.6%, 40.1% to the UK and Netherlands markets respectively this indicates an increase in the market share of Egyptian onion exports in those European markets, while the index of market penetration rate of onion crop in Italy and Germany decreased during the study period by 17.5% and 60.3% respectively.

3. Price Ratio of Egyptian Onion Exports in the important European Countries markets (2008-2018): It is calculated by dividing the export price of competing countries from a crop/Egypt's export price for the same crop. If the value of this indicator up to correct one. This indicates that Egypt has a competitive price advantage in exporting this crop and vice versa.

Table 7: Evolution of the Price Ratio Index of Onion Crop for Major European Countries (2008-2018).

Years	UK	Netherland	Italy	Germany
2008	1.58	1.89	1.77	1.35
2009	0.78	1.06	0.70	0.79
2010	1.93	1.77	1.78	1.65
2011	1.72	1.64	1.49	1.87
2012	1.28	1.45	1.44	1.25
2013	2.18	1.58	1.09	1.92
2014	1.39	1.22	1.11	1.48
2015	1.93	1.23	1.01	0.94
2016	0.79	0.91	0.98	0.73
2017	0.58	0.68	0.45	0.34
2018	0.67	0.79	0.74	0.35
Average	1.35	1.29	1.14	1.15

Source: Compiled and calculated from data tables (4), (5) and (6)

Table 8: Evolution of the Composite Index of Onion Competitiveness for the Most Important European Countries (2008-2018).

Years	UK	Netherland	Italy	Germany
2008	1.68	3.89	2.02	0.69
2009	1.66	2.83	1.90	0.38
2010	1.65	27.91	4.76	0.64
2011	1.79	7.76	2.25	0.77
2012	1.94	6.36	2.39	0.54
2013	2.14	14.24	2.98	0.91
2014	3.14	88.86	3.60	0.88
2015	2.64	11.06	3.22	0.69
2016	1.77	18.11	3.38	0.60
2017	2.69	10.15	6.12	0.54
2018	2.86	7.66	2.70	0.44
Average	2.18	18.1	3.21	0.64

Source: Compiled and calculated from data tables (4), (5) and (6)

Data from table 7, showed an increase in the price ratio index of the onion crop compared to the competing countries in the European as for the Egyptian export onion price, it averaged about 1.35, 1.29, 1.14 and 1.15 in the UK, Netherlands, Italy and Germany respectively, this indicates that Egypt is in terms of price competitiveness of the onion crop in those countries this is because of its lower export prices compared to competing countries.

4. Composite Index of Competitiveness of Egyptian Onion Crop Exports in Major European Countries (2008-2018): The composite index of competitiveness reflects the country's competitiveness in foreign markets, which is the average of the previous three indicators, it is the market share, market penetration rate and price ratio, where value of the index were increase indicates that the country enjoys an advanced position compared with competing countries and vice versa. It is calculated by the following equation:

CICj =(M.S. + PRI + MPRij)/3

Where:

CICj: Composite index of competitiveness in overseas markets..

M.S: Market Share Index..

PRI: Price Ratio Index (Competitive Position).

MPRij: Market Penetration Index.

Data table 8 shows that the comparative advantage and competitiveness of Egypt's onion exports indicator in the most important European market we found, it ranged from a minimum 0.64 in the German market to a maximum about 18.1 in the Netherlands during the average period which we study, so the competitiveness of Egypt's onion exports increased in the European Union by 70.6%, 96.9% and 33.2% for UK, Netherlands, Italy respectively during the study period, the competitiveness indicator of the Egyptian onion exports crop in the EU countries more than one so, this means that Egypt enjoys a competitive advantage in this countries compared to competing countries during the study period, otherwise stated the value of the indicator in the German market decreased by about 36.9% during the same period this means that Egyptian onions enjoy a competitive advantage in the German market compared to their competitors this may be due to lower market share indices, market penetration rate of Egyptian onion exports in Germany during the study period.

Fourth: Standard Estimation of External Demand Functions for Egyptian Onion Exports in the Major European Countries During the Period (2000-2017): The standard estimation of external demand functions was performed for the Egyptian onion crop to the most important European countries during the period (2000-2017) to identify the most influential variables in external demand for onion crop in the most important European countries this is after using different mathematical images of functions like linear and half logarithmic and double logarithmic, so it was chosen as the best of these images based on the values (t) for the parameters of the independent variables contained in the function in addition to the tests F and R^{-2}. The functions involve external demand for onion crop in the most important European countries dependent variable, So it represents the amount of Egyptian exports of onion to the most important European countries in tons (Y_t) and several independent variables (explanatory) represented in, (X_1) total domestic production of onion yield per ton, (X_2) total domestic consumption of onion yield per ton, (X_3) exported price of onion crop in dollars / ton, (X_4), (X_5) exported quantity of onion crop competition for the most important countries in tons, (X_6), (X_7) export price of the most important markets for competitors Egyptian onion crop in dollars / ton, (X_8) official exchange rate in Egyptian pounds / dollars.

By estimating the external demand functions of the Egyptian onion crop in the most important European countries, the regression coefficients are consistent with statistical and economic logic in terms of sign, also the regression coefficients were significant at (0.01, 0.05).

We found from The double logarithmic model of the UK market showed there were a direct correlation between the exports quantity of Egyptian onion crop to the UK market (Y_t) and all of the local production of Egyptian onion (X_1), Also (X_6) it means the Netherlands

Table 9: Results of Evaluation of External Demand Functions of Egyptian Onion Crop in Major EU Countries (2000-2017).

Function	Model
United kingdom (Double logarithmic)	$\mathbf{LogY_t} = 25.126 + 1.549\,\mathbf{Log\,X_1} + 1.914\,\mathbf{LogX_6}$ $(5.47)^{**}$ $(4.60)^{**}$ $(3.17)^{**}$ **F**=28.0 $\mathbf{R^{-2}}$=0.760 **D.W**=1.6
Netherlands (Double logarithmic)	$\mathbf{LogY_t} = 31.15 + 2.421\,\mathbf{Log\,X_1} - 2.379\,\mathbf{LogX_3} + 2.62\,\mathbf{LogX_7} + 2.369\,\mathbf{LogX_8}$ $(4.56)^{**}$ $(4.43)^{**}$ $(3.60)^{**}$ $(-3.54)^{**}$ $(4.38)^{**}$ **F**=41.4 $\mathbf{R^{-2}}$=0.905 **D.W**=1.7
Italy (Double logarithmic)	$\mathbf{LogY_t} = 3.502 + 0.872\,\mathbf{LogX_7}$ $(1.95)^{*}$ $(2.00)^{*}$ **F**=4.0 $\mathbf{R^{-2}}$=0.447 **D.W**=1.6
Germany(Double logarithmic)	$\mathbf{LogY_t} = 4.067 + 1.828\mathbf{LogX_6}$ (0.85) $(2.29)^{*}$ **F**=5.2 $\mathbf{R^{-2}}$=0.497 **D.W**=1.6

Significant at a probability level of 0.01. *Significant at a probability level of 0.05**. Source: Compiled and calculated from table 3 by research

exported price of onion to the United Kingdom market, It was found that an increase of 1% in each lead we have indicated before to increasing the amount of Egyptian exports of onions to the market of the United Kingdom about 1.55%, 1.99% Respectively. It was also found that these variables account for about 76% of the change in the quantity of Egyptian exports of onions to the UK market - table 9. The double logarithmic model of the Netherlands market showed a direct correlation between the quantities of Egyptian exports of onion crop to the Netherlands market (Y_t). Each of the following: local production of Egyptian onions (X_1), Poland export price of onion to the Netherlands market (X_7), the dollar exchange rate against Egyptian Pound (X_8), It was found that an increase of 1% in each of them leads to increase the quantity of Egyptian exports of onions to the Netherlands market by about 2.42%, 2.62% and 2.36%, respectively, While there was an inverse relationship between the quantity of Egyptian exports of onion crop to the Netherlands market (Y_t) and the export price of Egyptian onions (X_3), It was found that an increase of 1% in the export price of Egyptian onions leads to a decrease in the quantity of Egyptian exports of onions to the Netherlands market by about 2.38%. It was also found that these variables explain about 90.5% of the change in the quantity of Egyptian exports of onions to the Netherlands market - table 9. The double logarithmic model of the Italian market showed a direct correlation between the quantity of Egyptian exports of the onion crop to the Italian market (Y_t) and the price of Germany's export of onions to the Italian market (X_7). To increase the quantity of Egyptian exports of onions to the Italian market by about 0.9%. It was also found that these variables explain about 44.7% of the change in the quantity of Egyptian exports of onions to the Italian market - table 9. The double logarithmic model of the German market showed a direct correlation between the quantity of Egyptian exports of onion crop to the German market (Y_t) and the price of Spain's export of onions to the German market (X_6). To increase the amount of Egyptian exports of onions to the German market by about 1.83%. It was also found that these variables explain

Table 10: Egyptian Onion Exports to Major European Countries during the Period (2000-2017).

Market	Function	Model
United kingdom	**Basic model**	$\mathbf{LogY_t} = 4.178 + 0.875\,\mathbf{LogY_{-1}} - 0.504\,\mathbf{LogX_3}$
	(short term) Partial	$(5.13)^{**}$ $(6.85)^{**}$ $(-2.42)^{*}$
	Modification	**F**=33.8 $\mathbf{R^{-2}}$=0.794 **D.W**=1.7
	Form (long-term)	$\mathbf{LogY_t} = 33.424 - 4.032\,\mathbf{LogX_3}$
Nether-lands	**Basic model**	$\mathbf{LogY_t} = 3.919 + 0.787\,\mathbf{LogY_{-1}} - 0.211\,\mathbf{LogX_3}$
	(short term) Partial	$(3.95)^{**}$ $(13.4)^{**}$ $(-2.47)^{*}$
	Modification	**F**=138 $\mathbf{R^{-2}}$=0.942 **D.W**=2.4
	Form (long-term)	$\mathbf{LogY_t} = 14.987 - 0.991\,\mathbf{LogX_3}$
Italy	**Basic model**	$\mathbf{LogY_t} = 6.038 + 0.434\,\mathbf{LogY_{-1}} - 0.224\,\mathbf{LogX_3}$
	(short term) Partial	$(4.11)^{**}$ $(2.64)^{**}$ $(-1.97)^{*}$
	Modification	**F**=4.7 $\mathbf{R^{-2}}$=0.617 **D.W**=1.6
	Form (long-term)	$\mathbf{LogY_t} = 10.668 - 0.396\,\mathbf{LogX_3}$
Germany	**Basic model**	$\mathbf{LogY_t} = 6.897 + 0.456\,\mathbf{LogY_{-1}} - 0.513\,\mathbf{LogX_3}$
	(short term) Partial	$(4.11)^{**}$ $(3.68)^{**}$ $(-2.22)^{*}$
	Modification	**F**=10.1 $\mathbf{R^{-2}}$=0.517 **D.W**=2.2
	Form (long-term)	$\mathbf{LogY_t} = 12.678 - 0.943\,\mathbf{LogX_3}$

Significant at a probability level of 0.01. * Significant at a probability level of 0.05**. Source: Compiled, calculated and calculated from reference (1), (2) by research.

Table 11: Standards and tests to select the best models to predict the amount of Egyptian onions for the most important EU countries exports until 2023.

Variable	Arima Model	Statistical tests	
		Thales checksum	Roots of mean squared errors
Egyptian onion exports to UK		0.17	4.318
Egyptian onion exports to the Netherlands		0.10	3.696
Egyptian onion exports to Italy		0.29	2.6752
Egyptian onion exports to Germany		0.40	1.585

Source: Compiled and calculated from table 10 by research.

about 49.7% of the change in the quantity of Egyptian exports of onions to the German market - table 9.

Fifth: the standard estimate of the desired and targeted level of Egyptian onion exports to the most important European countries: The quantity of Egyptian onion exports to the main European target countries (Y_t) is determined by a economic factors set, the most important of which are: (1) Egyptian onion exports to the most important European countries in the previous year (Y_{t-1}), (2) export price of onion Egyptian dollars / ton (X_3) and when we do *Multiple Regression Analysis* for Specific explanatory variables for Egyptian onion exports to the most important European countries during the period (2000-2017) showing double logarithmic models short-term advantage and they have been converted into long-term models by Adjustment Coefficient, Where Nerolov's partial modification model is considered is one of the long-term dynamic models. Where λ represents Modification coefficient, its value ranges from zero to the one Its value near zero indicates that a small part of the imbalance between the actual situation and Equilibrium, it is adjusted within one period time as for the value near the right one. It indicates that a large part of the gap between the actual situation and his desired and targeted counterpart. It is covered within one period time, there for, value of (λ) determines the speed of adjustment or modification, but the average slow down period Adjustment Lag were equal (1-λ).

It is clear from estimated Parameters for Standard model estimated for exports of Egyptian onions to the most important European countries so the value of (1-λ). In the short-term standard model reached about 0.875, 0.787, 0,434, 0.456 for United Kingdom, Netherlands, Italy, Germany respectively, so the adjustment coefficient (λ) is estimated at about 0.125, 0.213, 0.566, 0.544 for the markets of European countries respectively, Thus, the long-term model could be expressed in table number 10, the main determinants of Egyptian onion exports are evident to The most important European countries in the short and long term was the export price of Egyptian onions. for the estimated long-term standard model of Egyptian onion exports to the UK market. It was found that the most important determinants in the short and long run were the export price of Egyptian onions from the long-run standard economic model any change of Egyptian onions export price by 1% leads to change in trend reversal of Egyptian onion exports to UK target market by 4.03%.

For the long-run standard model estimated for Egyptian onion exports to the Netherlands market has shown that the most important determinants in the short and long run was the Egyptian onions exports price. It was found from the economic model of the standard long-run change that any rate of 1% in Egyptian onions exports price this leads to a change in the trend reversal of Egyptian onion exports to the Netherlands target market of 1% - table 10.

For the standard model for the long-run estimated exports of Egyptian onion market Italy. It was found that the most important determinants in the short and long run were the Egyptian onions exports price of, it was found from the economic model of the standard long-run change that the rate of 1% in the Egyptian onions exports price is lead to a opposite direction change in the Egyptian exports of onions to Italy market target about 0.4% rate - from table 10. As for the long-term standard model estimated for Egyptian onion exports to the German market, it was found that the most important determinants in the short and

Table 12: Predicting the quantity of Egyptian onion exports to the most important countries of the European Union per thousand tons until 2023.

Years	UK	Netherland	Italy	Germany
2018	1.88	4.40	3.29	0.47
2020	3.01	5.19	4.44	0.26
2021	1.53	5.21	9.55	0.15
2022	1.91	5.42	4.28	0.26
2023	2.83	5.61	4.49	0.26
Amount of change for 2018				
Percentage change from 2018				
Theil Inquality Test				

Source: Compiled and calculated from table 10 by research.

long run were the Egyptian onions exports price. It was found from the economic model of the standard long-run when any change rate by 1% in the Egyptian onions exports price of lead to a change in the opposite direction of the Egyptian exports of onions to the Germany market target by 0.94% rate - table 10.

Sixes: Predicting the quantity of Egyptian onion exports to the most important EU countries until 2023: The quantity of Egyptian onion exports has been predicted for the most important European countries using the Box-Genghis methodology (Arima) until 2023. After verifying the onion chains of the quantity of onion exports to the most important EU countries and when we do many different statistical estimates to identify the appropriate models to settle on a number of models Arima. It can be similar to the timeline of actual data. It was found that the best estimates of the quantity of onion exports to the most important EU countries are (1,1,1), (3,1,3), (1,1,2) (0,1,4) for the United Kingdom, the Netherlands, Italy and Germany respectively. It was also confirmed that the coefficients of partial and self-correlation and the self-correlations of the rest of the estimated models all fall within the 95% confidence interval. This means that the estimated models are not self-correlating and therefore the estimated models are appropriate. It was found that the value of thel coefficient approached zero more than the correct one and therefore there is an accurate prediction - table 11.

It was found from the results of forecasting the quantity of Egyptian onion exports to the most important EU countries. It is expected to reach about 22.54, 35.03 and 5.53 thousand tons in 2023, an increase of about 7.3%, 9.7% and 2.1% of 2018 for the United Kingdom, the Netherlands and Italy respectively. Meanwhile, Egyptian onion exports to Germany are expected to decline by about 0.1% from 2018 (Table 12).

The results of the prediction of the quantity of Egyptian onion exports to the most important countries of the European Union, it is expected to reach about 22.54 From 2018 to the United Kingdom, the Netherlands, Italy respectively. Meanwhile, the volume of Egyptian onion exports to Germany is expected to decline by about 0.1% from 2018 (Table 12).

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