Competitiveness and global demand determinants for Egyptian grapes

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Abstract: The research aims to shed light on the competitive position of Egyptian grapes exports, and to help export policy makers on the possibility of increasing the amount of Egyptian grapes exports in foreign markets, through the following: measuring some economic indicators of the competitiveness of Egyptian grapes exports in the most important global markets during (2017-2021), the statistical estimation of the global demand for Egyptian grapes exports in its most important foreign markets during (2006-2021), and to identify the future of foreign trade of Egyptian grapes by predicting the amount of grapes exports until 2025. The research is based on the use of some methods of descriptive and quantitative statistical analysis in the analysis of data related to the research, specifically the following: some statistical methods, the method of percentages of averages of deviations of actual values, coefficient of geographical concentration of the quantity and value of exports, some economic indicators of the competitiveness of Egyptian exports of the crop in the most important world markets, as follows:(Revealed Comparative Advantage, Symmetric Revealed Comparative Advantage, Markets Penetration Rate, Market Share, and Relative Price),Stepwise multiple regression, in addition to Box-Jenkins (ARIMA) model. The research depends on published and unpublished secondary data derived among the agricultural statistics bulletins issued by The Economic Affairs Sector of the Ministry of Agriculture and land reclamation, (www.trademap.org), (www.Capmas.gov.eg), and (www.fao.org), in addition to the use of some researches, studies, journals, scientific books and Arabic and foreign references related to the research topic, the data has been analyzed on the computer by using SPSS $_{v.16}$& E-views$_{12}$ programs.

Keywords: Egyptian grapes, Competitiveness, Exports, Geographical concentration coefficient, Instability coefficients, Markets Penetration Rate, Market Share, Global demand function, and ARIMA model.

Introduction:

The develop. of Egyptian exports is considered one of the top priorities that attracts the largest share of the state's attention, as it is one of the main sources of obtaining foreign exchange, and pushing the wheel of comprehensive development, especially in light of accelerated global changes, in addition to reducing the deficit in the Egyptian trade balance, which drains a large part of development revenues[1], as the deficit amounted to about 33.08 billion dollars in 2021 as a result of the increase in the value of total imports, amounting to about 73.78 billion dollars from the value of total exports, amounting to about 40.70 billion dollars during the same year, while the agricultural production is about 2.09 billion dollars as a result of an increase in the value of Agricultural imports amounting to about 4.98 billion dollars compared to the value of agricultural exports amounting to about 2.89 billion dollars during the same year[2].

Grapes are considered one of the most important fruit crops in Egypt due to its economic and nutritional importance, as the fruitful area of grapes in Egypt is about 157.38 thousand feddan, representing about 10.33% of the total fruit area of about 1.52 thousand feddan, and the total production of Egyptian grapes is about 1.47 million tons, representing about 12.64% of the total Egyptian fruit production of about 11.63 million ton in 2021[3], and is also an important export fruit crops, as the value of grape exports about 254.33 million dollars, representing about 0.62% of the total value of Egyptian total exports amounting to about 40.70 billion dollars, and about 8.79% of the total value of Egyptian agricultural exports of about 2.89 billion dollars in 2021[4].

Problem:

Despite the importance of the grapes crop as one of the important export crops in Egypt, which the Egyptian agricultural policy aims to maximize the export yield

from it, the amount of exports from it is not commensurate with the amount of local production, as the average amount of exports of Egyptian grapes to foreign markets is about 142.71 thousand ton, represent. about 9.58% of the total average production of about 1.49 million ton during the period (2006-2021)[4], in addition to the competition faced by the Egyptian grape crop in foreign markets and this affected the quantities exported to the most important markets imports, which were characterized by fluctuation and instability during the same period, ranged from a min. of about 27.81 Thousand ton in 2006, & a max. of about 623.24 thousand ton in 2011[4], which affects the volume of foreign exchange earnings from this important export crop.

Objectives:
The research aims mainly to shed light on the competitive position of Egyptian grapes exports, & to help export policy makers on the possibility of increasing the amount of Egyptian grapes exports in foreign markets, through the following sub-objectives:(1) Studying the fruitful area, yield and the production of grapes in Egypt during the period (2006-2021).(2) Studying the quantity, value and export prices of Egyptian grapes exports and their instability during the period (2006-2021).(3) Assessing the export status of Egyptian grapes and identifying the most important competing countries for Egypt in exporting grapes to global markets during the period (2017-2021).(4) Identifying the distribution and geographical concentration of Egyptian grapes exports in foreign markets during the period (2017-2021). (5) Measuring some economic indicators of the competitiveness of Egyptian grapes exp. in the most import. global markets during (2017-2021).(6) The statistical estimation of the global demand for Egyptian grapes exports in its most important foreign markets to determine the most important determining factors for the demand for these exports in each of these markets during the period (2006-2021).(7) To identify the future of foreign trade of Egyptian grapes by forecasting the amount of grapes exports until 2026 by determining the best standard methods used in forecast. by using (box – Jenkins) model.

Method:
The research in achieving its goals is based on the use of some methods of descriptive and quantitative statistical analysis in the analysis of data related to the research, specifically the following methods and methods were used;
(1) Some statistical methods such as: arithmetic averages, percentages, geometric averages, and annual growth rates of the economic variables in question, as follows:

- Arithmetic mean[5]: can be calculated from the following relationship:
A.M. = Sum of observations / Total number of observations
A.M. = $X_1 + X_2 + X_3 + X_4 + X_5 + ... + X_n$ / n
Where:
$X_1, X_2, X_3, X_4, X_5, ..., X_n$: the observations.
n: Num. of observations.
- Geometric mean[5]: it can be calculated from the following relation:
$$G\,M = \sqrt[n]{X1\,X2\,X3\,......\,Xn}$$
Where;
N = Number of terms (x) that are multiplied.
- Growth rate[6]: it can be calculated from the growth function, which takes the following formula:
$Y = e^{(a+bx)}$
It is a logarithmic function of the exponent, that is, it is raised on the natural basis e, and by entering the logarithm on it, the function becomes the following formula:
Ln Y= a + b X
In economics, this exponential function is called the growth function if it is calculated for time series, where the slope of (X) and (b) indicates the annual growth rate, which if multiplied by (100) becomes a percentage.
(2) The method of percentages of averages of deviations of actual values from estimated values to calculate "instability coefficients"of the economic variables in question can be calculated as follows[7]:
Instability coefficient = $(| Y_i - y^8_i | / y^8_i)* 100$
Where:
Y = the actual value of the variable in year i.
y^8 = estimated or directional value of the variable in year i.
(3) The coefficient of geographical concentration of the quantity and value of exports, and can be calculated as follows[8]:
$$C_{jx} = 100 \sqrt{\Sigma \frac{(X_{sj})^2}{(X_i)^2}}$$
Where:
C_{jx}: Coefficient of the geographical concentration of the quant. and value of the Egyptian export. of the crop.
X_{sj}: Quantity or value of Egyptian exports of a crop destined for a particular country.
X_i: the total quantity or value of Egyptian exports of the crop.
(4) Some economic indicators of the competitive. of Egyptian exports of the crop in the most import. world markets, as follows:
-Revealed Comparative Advantage (R. C. A.)[9]:
R.C.A.$_{ij}$ =$(X_{ij} / X_{it})/(X_{wj} /X_{wt}) = (X_{ij} / X_{wj}) / (X_{it} / X_{wt})$
Where:

R.C.A.$_{ij}$: Revealed Comparative Advantage for the export. of country i of the commodi. (crop) j to the world.

X: represents value of exports.

i: is a country.

j : is a crop (commodity).

w: is a set of countries.

t: is a set of crops (or commodities).

-Symmetric Revealed Comparative Advantage (S.R.C.A.)[1]:

S.R.C.A.$_{ij}$ = R.C.A.$_{ij}$ – 1 / R.C.A.$_{ij}$ + 1

Where:

S.R.C.A.$_{ij}$: Symmetric revealed comparative advantage for the exports of country i of commodity j to the world.

R.C.A.$_{ij}$: Revealed Comparative Advantage for the exports of country i of commodity (crop) j to the world.

-Markets Penetration Rate (M. P. R.)[10]:

M.P.R.$_{ij}$ = X$_{ej}$ / Q$_{ij}$ + M$_{ij}$ - X$_{ij}$

Where:

M.P.R.: the market penetration rate of the importing country i of the commodity (crop) j.

X$_{ej}$: the quantity of exports of the exporting country e from the commodity (crop) j to the market of the importing country i.

Q$_{ij}$: the quantity of production of the importing country i from the commodity (crop) j.

M$_{ij}$: the amount of impor. of the importing count. i of the commodit. (crop) j.

X$_{ij}$: the amount of exports of the importing country i of the commodity (crop) j.

-Market Share[11]:

M.S.$_{ij}$ = (X$_{ij}$ / M$_{cj}$) * 100

Where:

M.S.$_{ij}$: the market share of the quantity of exports of state i of commodity j in a particular market.

X$_{ij}$: the quantity of exports of state i of commodity j to a particular market.

M$_{cj}$: the total amount of imported market imports c of commodity j from the world.

-Relative Price[12]:

R.P.$_{j}$ = P$_c$ / P$_e$

Where:

R.P.$_{j}$: the relative price of the commodity (crop) j.

P$_c$: the export price of a commodity (crop) j for a country in a particular market.

P$_e$: the export price of the same commodity j for each competing country in the same market.

(5) Stepwise multiple regression: to estimate the functions of global demand on the quantity of Egyptian exp. of the crop in its most import. global markets, the demand function takes the following formula[13]:

Y$_i$ = b$_0$ + b$_1$ x$_1$ + b$_2$ x$_2$ + ….. + b$_n$x$_n$ + e

Where;

Y$_i$: Response variable.

x$_1$, …... . , x$_n$: Predictor variables (fixed, nonrandom).

b$_i$,s (i = 1, 2, 3…..n) : Regression coefficients.

e: Model ,s error (also known as the residuals).

(6) Box-Jenkins (ARIMA)model[14]: to forecast the amount of Egyptian exports of the crop, it is based on deriving the arithmetic mean of the variable as models for future forecasting, after smoothing the data either in terms of variance or in terms of directionality, followed by estimating the remainder (random error) by a self-regression method with a moving aver., as in the follow. equation:

$$Y_{it} = \beta_0 + \beta_1 Y_{it\text{-}1} + \beta_2 Y_{it\text{-}2} + \text{--------} + \beta_\rho Y_{it\text{-}\rho} + \varepsilon_i + \theta_1 \varepsilon_{it\text{-}1} + \theta_2 \varepsilon_{it\text{-}2} + \text{--} + \theta\, \varepsilon_{it\text{-}q}$$

Autoregressive term(AR)　　Moving Average term (MA)

Where:

AR: The equation of seif-regression.

MA: moving average equation.

Data sources:

The research depends on published & unpublish. secondary data derived among the agricultural statistics bulletins issued by The Economic Affairs Sector of the Ministry of Agricult. and land reclamation in Egypt, the website of the Trade Statistics for International Business Development (www.trademap.org), the website of the central agency for public mobilization and statistics central Agency for Public Mobility and Statistics (www.Capmas.gov.eg), and the website of the food and Agriculture Organization of the United Nation (www.fao.org), in addition to the use of some researches, studies, journals, Scientific books and Arabic and foreign references related to the research

topic, the data has been analyzed on the computer using the two SPSS $_{V.16}$ & E-views $_{v.12}$.

Results and Discussion:

First: **The fruitful area, yield, and production of grapes in Egypt during the period (2006-2021)**

The data of Table (1) related to the develop. of the fruitful area, yield and production of Egyptian grapes during the period (2006-2021) shows the following:

(1) The fruitful area:

The fruitful area of Egyptian grapes ranged from a mini. of about 133.81 thousand feddan in 2020 with a record of about 90.86% compared to the base year (2006), and a maximum of about 184.25 thousand

feddan in 2016 with a record of about 125.11% compared to the base year, and the annual average was estimated at about 162.82 thousand feddan. The statistical significance of the annual rate of change of the fruiting area of Egyptian grapes has not been proven, which indicates that the fruiting area fluctuates between increase and decrease around the average during the research period.

(2) The yield:
The yield of Egyptian grapes ranged between a min. of about 7.81 ton/ feddan in 2011 with a record of about 80.35% compared to the base year (2006), and a maximum of about 9.95 tons/ feddan in 2008 with a record of about 102.37% compared to the base year, and the annual average of about 9.18 tons/feddan. The statistical significance of the annual rate of change of the yield of Egyptian grapes has not been proven,

which indicates that the yield fluctuates between increase and decrease around the average during the research period.

(3) The production:
The total production of Egyptian grapes ranged from a minim. of about 1183.97 thousand ton in 2020 with a record of 82.68% compared to the base year (2006), and a maximum of about 1734.42 thousand ton in 2017 with a record of 121.12% compared to the base year, and the annual average was estimated at about 1494.62 thousand ton. The statistical significance of the annual rate of change of the total production of Egyptian grapes has not been proven, which indicates that the total production fluctuates between increase and decrease around the average during the research period.

Table (1): The fruitful area, yield, and production of the grapes in Egypt during the period (2006-2021).

Year	Fruitful area		Yield		Production	
	Thousand feddan	Index	Ton/Feddan	Index	Thousand ton	Index
2006	147.27	100	9.72	100	1431.97	100
2007	149.36	101.42	9.94	102.26	1485.01	103.70
2008	153.96	104.54	9.95	102.37	1531.42	106.94
2009	152.28	103.40	8.99	92.49	1370.24	95.69
2010	152.46	103.52	8.92	91.77	1360.25	94.99
2011	169.07	114.80	7.81	80.35	1320.80	92.24
2012	157.77	107.13	8.74	89.92	1378.82	96.29
2013	164.31	111.57	8.73	89.81	1434.67	100.19
2014	171.88	116.71	9.29	95.58	1596.17	111.47
2015	178.32	121.08	9.46	97.33	1686.71	117.79
2016	184.25	125.11	9.18	94.44	1691.19	118.10
2017	180.82	122.78	9.59	98.66	1734.42	121.12
2018	177.38	120.45	9.25	95.16	1641.08	114.60
2019	174.72	118.64	9.13	93.93	1594.78	111.37
2020	133.81	90.86	8.85	91.05	1183.97	82.68
2021	157.38	106.86	9.36	96.29	1472.42	102.82
Average	162.82		9.18		1494.62	
Min.	133.81		7.81		1183.97	
Max.	184.25		9.95		1734.42	

Source: Compiled and calculated from: Ministry of Agricult. and Land Reclama., Economic Affairs Sector, Agricultur. Statistics Bulletin, Cairo, Egypt, Various issues during the period (2006-2021).

Second: The quantity, value and export prices of Egyptian grapes exports and their instability coefficients during the period (2006-2021)
The data of table (2) related to the quantity, value and export prices of Egyptian grapes exports during the period (2006-2021) shows the following:

(1) Quantity of exports:
The amount of exports of Egyptian grapes ranged from a minimum of about 27.81 thousand ton in 2006 with

an index of about 100% (which is the base year), and a maximum of about 623.24 thousand ton in 2011 with an index of about 2241.06% compared to the base year, and the annual average was estimated at about 142.71 thousand ton. The statistical significance of the annual rate of change of the quantity of Egyptian grape exports has not been proven, which indicates that the quantity fluctuated between increase and decrease around the average during the research period.

(2) Exports value:
The value of exports of Egyptian grapes ranged from a minimum of about 21.86 million dollars in 2001 with an index of about 100% (which is the base year), and a maxim. of about 254.33 million dollars in 2021 with an index of about 1163.45% compared to the base year, and its annual average was estimated at about 198.57 million dollars. The value of exports of Egyptian grapes has taken an increasing and statistically significant trend at the probabilistic level of 0.01 during the research period with an annual increase of about 10.23 million dollars, representing about 5.15% of the annual average.

(3) Export prices:
The export price of Egyptian grapes ranged between a minimum of about 337.05 dollars/ ton in 2011 with an index of about 42.88% compared to the base year (2006), and a maximum of about 2409.09 dollars/ ton in 2010 with an index of about 306.48% compared to the base year, and its annual average was estimated at about 1709.05 dollars/ton. The export price of Egyptian grapes has taken an increasing and statistically significant general trend at the probabilistic level of 0.01 during the research period with an annual increase of about 112.79 USD/ton, representing about 6.60% of the annual average.

Table (2): The quantity, value and export prices of Egyptian grapes exports during the period (2006-2021).

Year	Export quantity		Export prices		Export value	
	Thousand ton	Index	USD/Ton	Index	Million USD	Index
2006	27.81	100	786.05	100	21.86	100
2007	53.70	193.09	1109.68	141.17	59.59	272.59
2008	199.06	715.79	811.01	103.18	161.44	738.52
2009	135.59	487.56	1662.22	211.46	225.38	1031.02
2010	83.87	301.58	2409.09	306.48	202.05	924.29
2011	623.24	2241.06	337.05	42.88	210.06	960.93
2012	116.05	417.29	1932.87	245.89	224.31	1026.12
2013	88.14	316.94	2080.33	264.66	183.36	838.79
2014	113.48	408.05	2159.68	274.75	245.08	1121.13
2015	166.59	599.03	1450.39	184.52	241.62	1105.31
2016	133.79	481.09	1633.08	207.76	218.49	999.49
2017	120.87	434.63	1963.68	249.82	237.35	1085.77
2018	96.07	345.45	2306.13	293.38	221.55	1013.49
2019	113.98	409.85	2060.80	262.17	234.89	1074.52
2020	103.75	373.07	2272.48	289.10	235.77	1078.55
2021	107.30	385.83	2370.27	301.54	254.33	1163.45
Average	142.71		1709.05		198.57	
Min.	27.81		337.05		21.86	
Max.	623.24		2409.08		254.33	
Change Rate (%)	-		6.60*		5.15*	

Source: Trade statistics. For international business develop. (trademap) (2022), by: http://www.trademap.org

- Instability coefficients of Egyptian grapes exports:
By estimating the instability coefficients, it is possible to judge the degree of stability of the export policies of Egyptian grapes by measuring the extent of fluctuations in the quantity, value and price of exports, in addition to identifying the extent of Egypt's ability to meet export requirements, maintain and continue foreign markets for grape exports and prevent importers in countries exporting grapes to them from turning to the markets of other countries competing with Egypt, the value of the stability Coefficie. equal to 0 indicat. the optimal state of export stability, & the higher the value of this coefficie. instability

coefficients of quantity and value the export price of Egyptian grapes during the period (2006-2021) is as follows:

(1) Quantity of exports:
The instability coefficients for the amount of Egyptian grape exports ranged from a min. of about 1.52% in 2014, and a maxim. of about 479.84% in 2011 with a geometric average of about 21.59%, and since the average instability coefficients are more than zero, this indicates the lack of stability for the amount of Egyptian grape exports.

(2) Export price:

The instability coefficients of the export price of Egyptian grapes ranged from a minim. of about 1.38% in 2017,and a maxim. of about 97.09% in 2010 with a geometric average of about 16.32%, and since the average instability coefficients are more than zero, this indicates the lack of stability of the export price of Egyptian grapes.

(3) Export value:

The instability coefficients of the value of exports of Egyptian grapes ranged from a mini. of about 1.27% in 2017,and a maxi. of about 82.06% in 2006 with a geometric avera. of about 13.26%, which indicates the lack of stability of the value of Egyptian exports of grapes as a result of an increase in the average instability coefficients from zero.

Table (3): Instability coefficients for the quantity, value and exp. price of Egyptian grapes during the period (2006-2021).

Year	Quantity of exports			Export price			Export value		
	Actual (10³ ton)	Estimate (10³ ton)	Instability coefficients	Actual (USD/ ton)	Estimate (USD/ton)	Instability coefficients	Actual (Million USD)	Estimate (Million USD)	Instability coefficients
2006	27.81	95.71	70.94	786.05	939.66	16.35	21.86	89.93	82.06
2007	53.70	97.96	45.18	1109.68	1003.52	10.58	59.59	98.30	54.89
2008	199.06	100.26	98.55	811.01	1071.73	24.33	161.44	107.45	13.43
2009	135.59	102.61	32.14	1662.22	1144.57	45.23	225.38	117.44	47.74
2010	83.87	105.02	20.14	2409.09	1222.36	97.09	202.05	128.37	24.13
2011	623.24	107.49	479.84	337.05	1305.44	74.18	210.06	140.32	21.42
2012	116.05	110.01	5.49	1932.87	1394.17	38.64	224.31	153.37	22.42
2013	88.14	112.59	21.72	2080.33	1488.92	39.72	183.36	167.64	5.22
2014	113.48	115.24	1.52	2159.68	1590.12	35.82	245.08	183.24	20.32
2015	166.59	117.94	41.25	1450.39	1698.19	14.59	241.62	200.29	12.95
2016	133.79	120.71	10.83	1633.08	1813.61	9.95	218.49	218.92	2.52
2017	120.87	123.55	2.17	1963.68	1936.88	1.38	237.35	239.29	1.27
2018	96.07	126.45	24.02	2306.13	2068.52	11.49	221.55	261.56	9.42
2019	113.98	129.42	11.93	2060.80	2209.11	6.71	234.89	285.89	7.82
2020	103.75	132.45	21.67	2272.48	2359.26	3.68	235.77	312.50	11.04
2021	107.30	135.56	20.85	2370.27	2519.61	5.93	254.33	341.57	7.61
Average	142.71	114.56	21.59*	1709.05	1610.35	16.32*	198.57	190.38	13.26*
Min.	27.81	95.71	1.52	337.05	939.66	1.38	21.86	89.93	1.27
Max.	**623.24**	**135.56**	**479.84**	**2409.09**	**2519.61**	**97.09**	**254.33**	**341.57**	**82.06**

* Indicates the geometric mean.
Source: Compiled and calculated from Table (2).

Third: The export status of Egyptian grapes and the most important competing countries for Egypt in exporting grapes to LOBAL markets during the period (2017-2021)

The data of Table (4) related to the most important countries exporting grapes to global markets during the period (2017-2021) shows the following:

Egypt ranked sixteenth globally in the exported quantity of grapes during the period (2017-2021), where the amount of Egyptian exports of grapes amount. to about 108.39 thousand ton, represent. about 2.21% of the amount of world export. of grapes, amounting to about 4894.06 thousand ton as an average for the period (2017-2021), and preceded by from the first to the fifteenth place both: Chile, Italy, Peru, USA, China, South Africa, Netherlands, Turkey, India, China, Hong Kong Special Administrative Region, Spain, Uzbekistan, Afghanistan, Australia, and Lebanon respectively with a grape export volume of about 647.36, 467.08, 369.19, 369.01, 339.92, 335.16, 299.23, 228.28, 204.20, 197.29, 174.90, 149.46, 143.25, 134.30 and 130.91, athousand tons,

respectivelyrepresents about 13.23%, 9.56%, 7.55%, 7.54%, 6.95%, 6.85%, 6.11%, 4.66%, 4.17%, 4.03%, 3.57%, 3.05%, 2.93%, 2.74%, and 2.67% of the average amount of global exports for the period (2017-2021).

Egypt ranked twelfth globally in the value of grapes exports during the period (2017-2021), where the value of Egyptian grapes exports amounted to 236.78 million dollars, represent. about 2.71% of the value of world grape exports, amounting to about 8722.72 million dollars as an average for the period (2017-2021), preceded by the first to the eleventh place both: Peru, China, the USA, the Netherlands, Chile, Italy, South Africa, Spain, China and the Hong Kong Special Administrative Region, Australia, India respectively with a grape export value of about 883.01, 876.35, 856.77, 773.67, 759.26, 651.28, 566.71, 415.84, 367.95, 366.61, 293.85 a million dollars in the order represents about 10.12%, 10.05%, 9.82%, 8.87%, 8.70%, 7.47%, 6.50%, 4.77%, 4.22%, 4.20%, 3.37% respectively, of the value of global grapes exports as an average for the period (2017-2021).

Table (4): The most important grapes exporting countries in global markets during the period (2017-2021).

Exported country	Exported Q.		Exported V.	
	(1000 Ton)	%	(Million USD)	%
Chili	647.36	13.23	759.26	8.70
Italy	467.08	9.56	651.28	7.47
Peru	369.19	7.55	883.04	10.12
USA	369.01	7.54	856.77	9.82
China	339.92	6.95	876.35	10.05
S-Africa	335.16	6.85	566.71	6.50
Netherland	299.23	6.11	773.67	8.87
Turkey	228.28	4.66	165.84	1.90
India	204.20	4.17	293.85	3.37
Hong-Kong	197.29	4.03	367.95	4.22
Spain	174.90	3.57	415.84	4.77
Uzbekistan	149.46	3.05	123.76	1.42
Afghanistan	143.25	2.93	62.06	0.71
Australia	134.30	2.74	366.61	4.20
Lebanon	130.91	2.67	57.46	0.66
Egypt	108.39	2.21	236.78	2.71
Other*	596.13	12.18	1265.49	14.51
World	4894.06	100.00	8722.72	100.00

* Other countries include: Mexico, Greece, Republic of Moldova, Brazil, North Macedonia, Germany, Iran, Tajikistan, France, United Arab Emirates, Kazakhstan, Hungary, Morocco, UK of Great Britain and Northern Ireland, Armenia, Belarus, Saudi Arabia, Belgium, Argentina, Portugal, and others.
Source: Trade statistic for international business develop. (trademap) (2022), by: http://www.trademap.org

Fourth: Distribution and geographical concentration of Egyptian grapes exports in foreign markets (2017-2021)

The data of Table (5) related to the distribution and geographical concentration of Egyptian grapes exports in foreign markets for the average period (2017-2021) shows the following:

The United Kingdom of Great Britain and Northern Ireland is considered the UK the most important and largest countries in the world importing Egyptian grapes during the research period, as it ranked first in the imports of Egyptian grapes with an average amount of imports of about 27.61 thousand ton, representing about 25.47% of the total amount of Egyptian expo. of grapes to the world, amounting to about 108.39 thousand tons, and with a value of about 60.44 million dollars, represent. about 25.53% of the total value of Egypt's exports to the world, amounting to about 108.39 thousand ton, and with a value of about 60.44 million USD, representing about 25.53% of total value of Egypt's exports of the grapes, amounting to about 236,78 million dollars as the average for the research period, Netherlands came in second place with the average amount of imports of Egyptian grapes About 26.12 thousand ton represent about 24.10% of the total amount of Egyptian exports of grapes to foreign markets, with a value of about 57.11 million dollars representing about 24.12% of the total value of Egyptian grapes export. as an aver. for the research period, followed by the Russian Federation Russian Federation in third place where the average amount of exported Egyptian grapes to about 10.54 thousand ton representing about 9.72% of the total amount of Egyptian exports of grapes to the world, with a value of about 23.08 million dollars representing about 9.75% of total value of Egyptian grapes exports as average for the research period, followed by Germany in fourth place, where the average amount of Egyptian grapes exported. to about 9.81 thousand ton represent about 9.05% of the total amount of Egyptian exports of grapes to the world, with a value of about 21.35 million dollars representing about 9.02% of the total value of Egyptian grapes exports as an average for the research period, the markets of Slovenia, Malaysia, Saudi Arabia., South Africa., and the United Arab Emirates occupied the fifth to ninth positions respectively, where the amount of imports of Egyptian grapes amounted to about 4.91, 3.21, 3.12, 2.76, 2.71 thousand ton, respectively representing about 4.53%, 2.96%, 2.88%, 2.55%, 2.50% respectively of the total amount of Egyptian exports of grapes, with a value of about 10.78, 7.07, 6.73, 6.01, 5.88 million dollars, respectively, on the row represents about 4.55%, 2.99%, 2.84%, 2.54%, and 2.48%, respectively of total value of Egyptian export. of grapes as an avera. for the period (2017-2021).

Therefore, this research will focus on the most important import markets for Egyptian grapes, which are represented in the markets of the United Kingdom, the Netherlands, and the Russian Federation, where the quantity and value of Egyptian exports of grapes to these three markets together represent about 59.29%, 59.40% respectively of the total quantity and value of Egyptian exports of grapes as an average for the research period.

The geographical concentrate. of the quantity and value of Egyptian grapes export. is calculated using the Gini-Hirschman coefficient, the value of which ranges from zero to 100%, where whenever its value approaches 100%, i.e. high, this indicates that there is a high geographical concentration of the commodity in favor of a certain group of countries, meaning that the quantity and value of Egyptian exports of the commodity tends towards concentration in a few (limited) countries or markets, while if its value is close to zero, i.e. low, this indicates the distribution of exports to a large number of countries, i.e. expansion, diversity and multiplicity of imported markets for Egyptian grapes, and this reduces the risk of control of the markets. It was found that the value of the geographic. concentration coeff. of the quantity and value of Egyptian grapes exports during the research period amounted to about 38% and 41%, respectively, and thus the geographical concentration coefficien. of both the quantity and value of Egyptian grapes exports is relatively low, indicating that it was characterized by geographical concentration, meaning the expansion and diversity of imported foreign markets for Egyptian grapes.

Table (5): Distribution and geographical concentration of Egyptian grapes exports in the import markets as an average for the period (2017-2021).

Country	Imported Q		Imported Value	
	(1000 Ton)	**%**	**Million USD**	**%**
UK	27.61	25.47	60.44	25.53
Netherland	26.12	24.10	57.11	24.12
Russia	10.54	9.72	23.08	9.75
Germany	9.81	9.05	21.35	9.02
Slovenia	4.91	4.53	10.78	4.55
Malaysis	3.21	2.96	7.07	2.99
Saudi Arabia	3.12	2.88	6.73	2.84
S-Africa	2.76	2.55	6.01	2.54
UAE	2.71	2.50	5.88	2.48
Other*	17.60	16.24	38.33	16.18
World	108.39	100.00	236.78	100.00
Coefficient of geographical concentration (%)	0.38		41.00	

* Other countries include: Italy, Singapore, Oman, Kenya, Sudan, Ukraine, Kuwait, Norway, Poland, Switzerland, Indonesia, China, Hong Kong SAR, Austria, Belgium, Nigeria, Denmark, France, Bahrain, Ireland, Senegal, Latvia, Mauritius, Spain, Ghana, Uganda, Romania, Lithuania, Belarus, Syrian Arab Republic, Sweden, Maldives, and others.
Source: Trade statistic. for international business develop. (trademap) (2022), by: http://www.trademap.org

Fifth: Economic indicators of the competitiveness of Egyptian grapes exports in the most important. world markets during (2017-2021)

(1) The Revealed Comparative Advantage (R. C. A.):

The revealed comparative advantage Index provides useful information about the export potential of each country of goods, and this helps to assess the potential exports of this country to other countries importing this commodity in the future. If value of the revealed comparative advantage. coefficient is greater than the correct 1, this indicates the existence of a visible comparative advantage of the commodity on the world market, while if its value is less than the correct 1, it indicates the absence of a comparative advent. of that commodity. The data of Table (6) and Figure (1), which relates to the calculation of the coefficient of the revealed comparative advanta. of Egyptian grape exports during (2017-2021), shows the following:
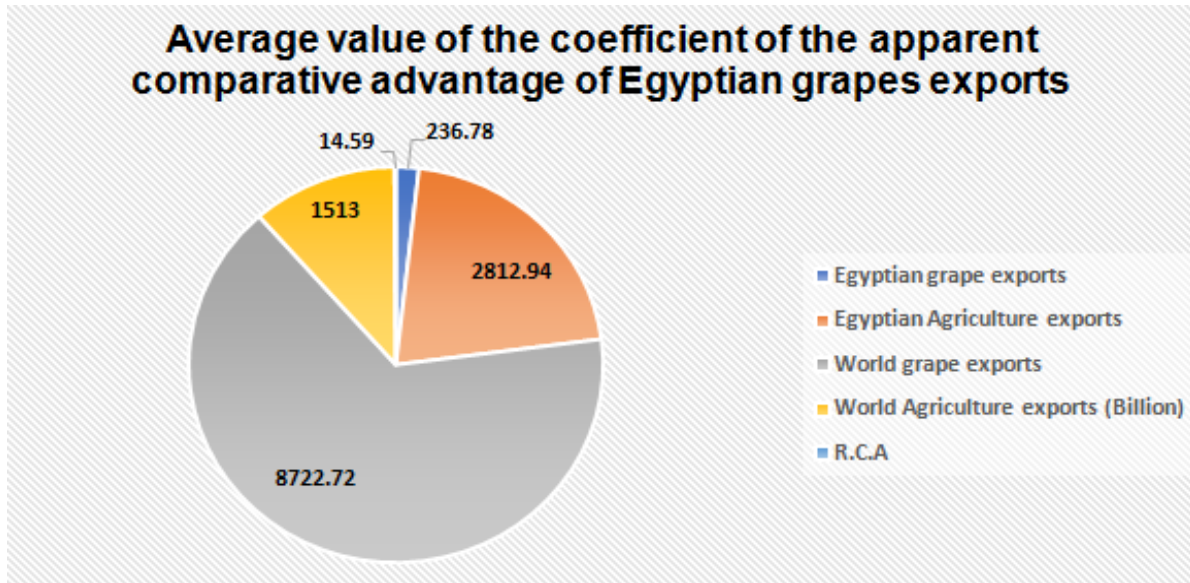
The coefficient of the reveal. comparative advent. of Egyptian grapes exp. during (2017-2021) ranged between a min. of about 13.68 in 2020, and a max. of about 16.49 in 2021 with an average of about 14.59, and due to the high value of the indicator from the correct one, this indicates that Egypt enjoys a revealed comparative advantage of grapes exports in the world markets during the average research period, indicating the possibility of increasing the opportunities for Egyptian grapes exports.

Table (6): Coefficient of the revealed comparative advantage of Egyptian grapes exports (2017-2023).

Year	Egyptian grapes exports value (Million USD)	Egyptian Agriculture exports value (Million USD)	World grapes exports value (Million USD)	World Agriculture exports value (Million USD)	R.C.A.
2017	237.35	2801.50	8146.02	1411716.00	14.68
2018	221.55	2791.70	8314.69	1456978.00	13.89
2019	234.89	2808.90	8507.01	1447956.00	14.22
2020	235.77	2770.20	9288.02	1493473.00	13.68
2021	254.33	2892.40	9357.86	1754667.00	16.49
Average	236.78	2812.94	8722.72	1512958.00	14.59

Source:
- Trade statistics for international business development (trademap) (2022), by: http://www.trademap.org
- Central Agency 4 Public Mobilization & Statistics (Capmas) (2022), by: http://www.Capmas.gov.eg
- Food and Agriculture Organization of the United Nations (FAO) (2022), by: http://www.fao.org.

Source: Table (6).

Figure (1): Average value of the coefficient of the revealed comparative advantage of Egyptian grapes exports (2017-2023).

(2) Symmetric Revealed Comparative Advantage (S. R. C. A.):

The index of the revealed comparative advantage has been adjusted due to the continuation of its value to infinity, and the value of the adjusted index ranges between -1, +1, where if the value of the coefficient of the adjusted revealed comparative advantage is positive, this indicates the existence of an revealed comparative advantage of the commodity in the world market, while if its value is negative, it indicates the absence of a comparative advantage of that commodity. The data of Table. (7) and Figure (2), which relates to calculation of the coefficient of the adjusted revealed comparative advantage of Egyptian

grapes exports during the period (2017-2021), shows the following:

The adjusted revealed comparative advantage index for Egyptian grapes exports during the period (2017-2021) ranged from a min. of about 0.864 in 2020, and a max. of about 0.886 in 2021 with an average of about 0.871, and given that the value of the symmetric revealed comparative advantage index is positive, this indicates that Egypt enjoys an revealed comparative advantage for grapes exports in world markets during the average research period, which indicates the possibility of increasing the opportunities for Egyptian grapes exports.

Table (7): The symmetric revealed comparative advantage of Egyptian grapes exports (2017-2023).

Year	(R.C.A.)	(S.R.C.A.)
207	14.68	0.872
2018	13.89	0.866
2019	14.22	0.869
2020	13.68	0.864
2021	16.49	0.886
Average	14.59	0.871

Source: compiled and calculated from Table (6).
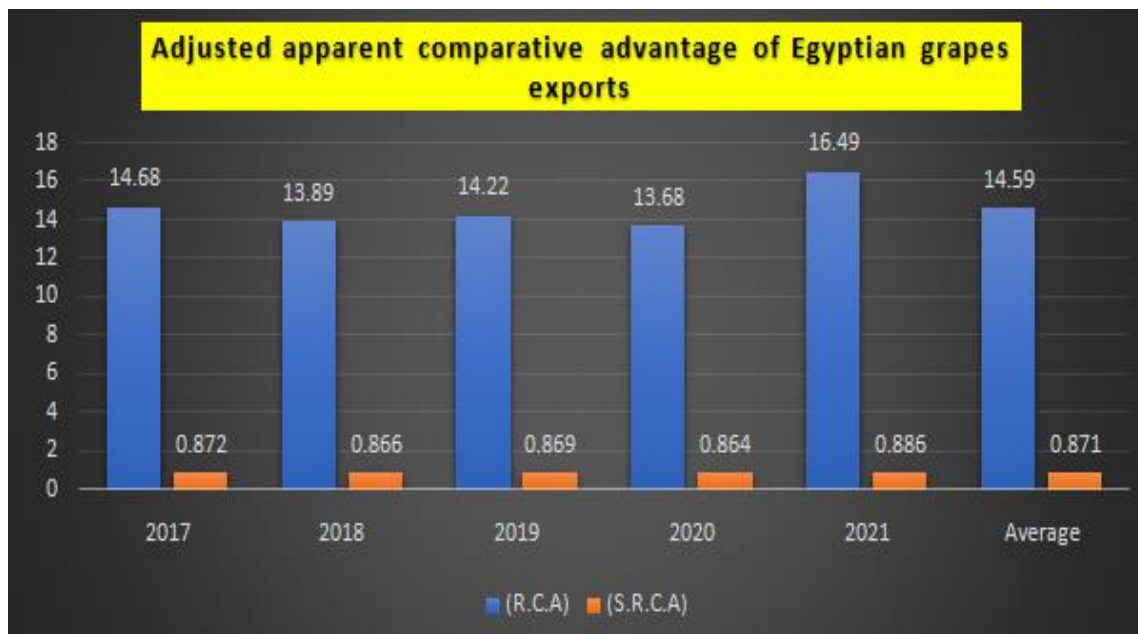
Source: Table (7).
Figure (2): The symmetric revealed comparative advantage of Egyptian grapes exports (2017-2023).

(3) Market penetration rate:
The market penetration rate expresses the rate between what is represented by the amount of exports of a country of a certain commodity (crop) to the apparent consumption of the importing country of this crop (production + imports – exports), and the value of this rate ranges between zero, 1 is correct, and the higher that value and approaches the correct one, this indicates the expansion of the market and the ease of entry of the commodity (crop) and increase its penetration rate in this market and vice versa. The data of Table (8) and Figure (3) concerning the penetration rates of Egyptian exp. of grapes to the most important import markets, namely the markets of the United Kingdom, the Netherlands, and the Russian Federation for the average period (2017-2021) shows the following:
The penetration rate of Egyptian grapes exports to the United Kingdom of Great Britain and Northern Ireland market ranged from a mini. of about 0.033 in 2018, and a maxim. of about 0.038 in 2017 with an average of about 0.035, which indicates that Egyptian exports of grapes to the UK of Great Britain and Northern Ireland represents about 3.5% of the total amount of apparent consumption of grapes within this market, amounting to about 779.89 thousand ton for the average period (2017-2021), and where that the rate value is close to zero, this indicates that Egypt is facing strong competition within the UK market of Great Britain & Northern Ireland.

The penetration rate of Egyptian grapes exports to the Netherlands market ranged from a min of about 0.677 in 2018, and a max of about 1.052 in 2020 with average of about 0.838, which indicates that Egyptian grapes exports to the Netherlands represent about 83.8% of the total amount of apparent consumption of grapes within this market of about 31.18 thousand ton for the average period (2017-2021), and as the value of that rate is close to the correct 1, this indicates the ease of exports of grapes to the market of the Netherlands and increase its penetration rate to it.
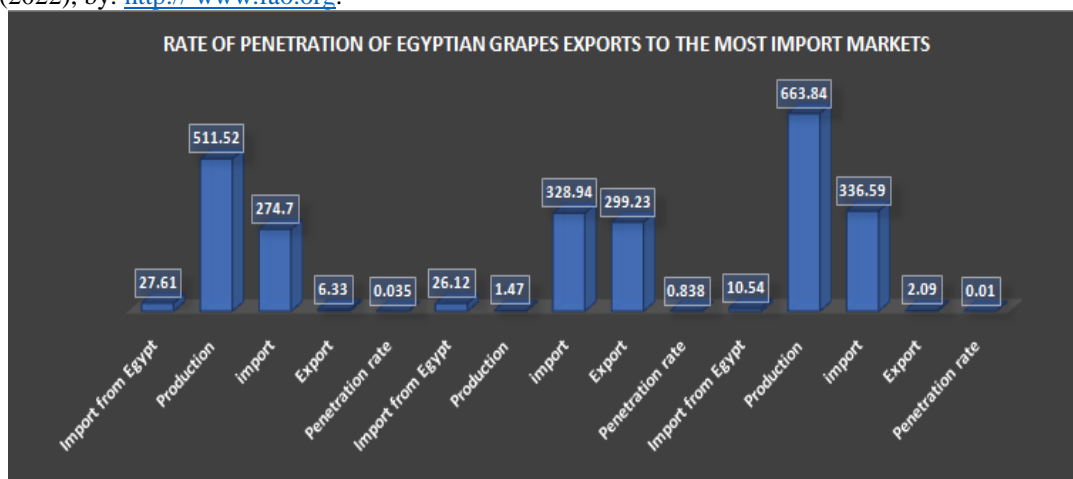
The penetration rate of Egyptian grapes exports to the Russian Federation market ranged from a min. of about 0.008 in 2018, and a max. of about 0.013 in 2017 with an average of about 0.010, which indicates that Egyptian grapes exports to the Russian Federation represent about 1% of the total amount of apparent consumption of grapes within this market of about 998.34 thousand ton for the average period (2017-2021), this indicates that Egypt faces strong competition within the Russian Federation market.

Table (8): Rate of penetration of Egyptian grapes exports to the most import markets(2017-2021).(thousand tons)

Year \ Markets		2017	2018	2019	2020	2021	Average
UK of Great Britain and Northern Ireland	Import from Egypt	29.68	26.04	27.91	27.59	26.86	27.61
	Production	511.91	505.51	517.22	511.55	511.42	511.52
	Import	271.34	272.91	281.73	277.24	270.28	274.70
	Export	6.59	6.54	6.91	9.13	2.50	6.33
	Penetration rate	0.038	0.033	0.035	0.035	0.034	0.035
Netherlands	Import from Egypt	30.17	24.03	24.67	25.86	25.85	26.12
	Production	0.40	1.70	1.60	1.70	1.93	1.47
	Import	300.85	321.32	334.10	320.84	367.60	328.94
	Export	267.15	287.54	302.98	297.96	340.53	299.23
	Penetration rate	0.885	0.677	0.754	1.052	0.891	0.838
Russian Federation	Import from Egypt	12.83	7.25	9.45	9.92	13.28	10.54
	Production	580.08	627.74	677.99	681.91	751.50	663.84
	Import	382.09	295.68	289.38	318.73	397.07	336.59
	Export	2.08	1.14	1.87	2.17	3.23	2.09

Source:
- Trademap (2022), by: http:// www.trademap.org
- Capmas (2022), by: http:// www.Capmas.gov.eg
- FAO (2022), by: http:// www.fao.org.

Source: Table (8).
Figure (3): Rate of penetration of Egyptian grapes exports with thousand tons to the most import markets (2017-2021).

(4) Market Share:
The market share index expresses the percentage of the country's exports of a commodity (crop) to a particular market, and the total amount of imports of this market from this crop from the world, and the rise of this percentage indicates the rise and improvement of the competitive position of the state in this market. The data of Table (9) and Figure (4) related to the market share of Egyptian grapes in the important import markets, namely the markets of the United Kingdom of Great Britain, the Netherlands, and the Russian Federation for the average period (2017-2021) shows the following:

The market share of Egyptian grapes within the United Kingdom of Great Britain and Northern Ireland ranged between a minimum of 9.54% in 2018, and a max of 10.94% in 2017, with an average of 10.05% for the average (2017-2021), and the import capacity of the United Kingdom of Great Britain and Northern Ireland of international grapes (grape imports from the world) amounted to about 274.70 thousand ton for the average of the same period.
The market share of Egyptian grapes within the Netherlands market ranged from a mini. of about 7.03% in 2021, and a maxi. of about 10.03% in 2017, with an average of about 7.93% for the average period (2017-2021), and the Netherlands import capacity of

international grapes amounted to about 328.94 thousand ton for the average of the same period.

The market share of Egyptian grapes within the Russian Federation market ranged from a min of about 2.45% in 2018 to a max of about 3.36% in 2017, with

an average of about 3.09% for the average (2017-2021), and the import capacity of the Russian Federation from international grapes amounted to about 336.59 thousand ton for the average of the same period.

Table (9): The market share of the Egyptian grapes in the most important import markets during (2017-2021). (thousand ton)

Item / Year	UK of Great Britain and Northern Ireland			Netherlands			Russian Federation		
	Import from Egypt	Import from world	Egyptian market share (%)	Import from Egypt	Import from world	Egyptian market share (%)	Import from Egypt	Import from world	Egyptian market share (%)
2017	29.68	271.34	10.94	30.17	300.85	10.03	12.83	382.09	3.36
2018	26.04	272.91	9.54	24.03	321.32	7.48	7.25	295.68	2.45
2019	27.91	281.73	9.91	24.67	334.10	7.38	9.45	289.38	3.27
2020	27.59	277.24	9.95	25.86	320.84	8.06	9.92	318.73	3.11
2021	26.86	270.28	9.94	25.85	367.60	7.03	13.28	397.07	3.34
Average	27.61	274.70	10.05*	26.12	328.94	7.93*	10.54	336.59	3.09*

* Geometric Mean.
Source:
- Trade statistics for international business develop. (trademap) (2022), by: http://www.trademap.org
- Central Agency for Public Mobilization and Stat. (Capmas) (2022), by: http://www.Capmas.gov.eg
- Food and Agriculture Organization of the United Nations (FAO) (2022), by: http://www.fao.org.
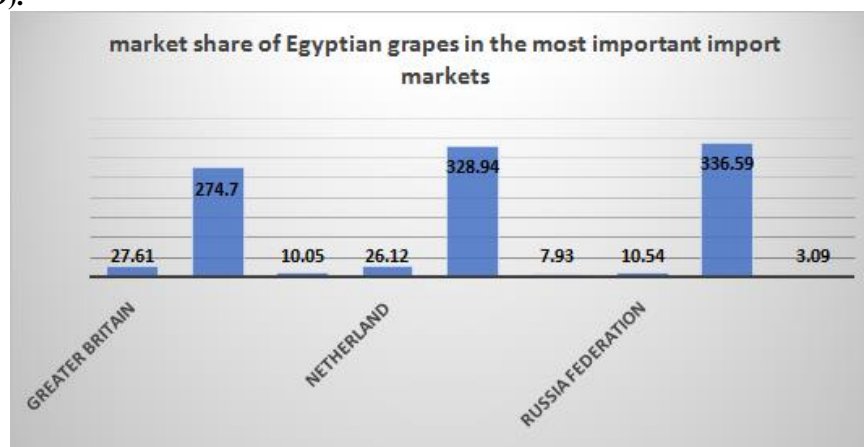
Source: Table (9).

Figure (4): The market share of the Egyptian grapes in the important import markets with thousand ton (2017-2021).

(5) Relative Price:
The relative price compares the export price of the crop to the country in question with the export prices of the crop to the most important competing countries within a particular market, and the lower the exp. price of the country compared to its counterpart in the competing countries within a market, i.e. the relative price falls below 1 true, this indicates the existence of a price competitive advantage for the country in exporting the crop and a better competitiveness compared to its competing countries, as shown by the data of Table (10) and Figure (5) concerning the price

ratio between the price of Egyptian grapes & the price of grapes for the most important competing countries within its most important import markets, namely the markets of the UK of Great Britain and Northern Ireland, the Netherlands, and the Russian Federation for the average the period (2017 - 2021) includes:

South Africa, Spain, and Chile are considered the most important competing countries for Egypt in exporting grapes to the United Kingdom market, where the ratio between the average export price of Egyptian grapes to the average export prices of South African, Spanish, and Chilean grapes within the United Kingdom market

is about 0.874, 0.889, 0.974 respectively, and since this ratio is less than 1 true, this indicates that Egypt has a competitive price advent. in exporting grapes compared to competing countries within the UK market, and therefore ability of the UK market to absorb as much amount as possible of Egyptian grapes for the average period (2017-2021),

South Africa, India, and Peru are considered the most important competing countries for Egypt in exporting grapes to the Netherlands market, where the ratio betw. the average exp. price of Egyptian grapes to the average export prices of South African grapes, Indian grapes, and Peruvian grapes within the Netherlands market is about 0.809, 1.105, and 0.780 respectively, this indicates that Egypt enjoys a competitive prices advantage in exporting grapes compared to competing

countries in the Netherlands market except India for the average period (2017-2021).

Turkey, Uzbekistan, and the Republic of Moldova are considered the most important competing countries for Egypt in exporting grapes to the Russian Federation market, where the ratio between average exp. price of Egyptian grapes to the average export price of Turkish, Uzbek, and Moldovan grapes within the Russian Federation market is about 2.169, 2.447, and 2.316 respectively, and since this ratio is greater than 1, this indicates that Egypt does not have a competitive price advantage in exporting grapes to the Russian Federation market compared to competing countries, and therefore the inability of the Russian Federation market to absorb as much as possible from Egyptian grapes for the average period (2017-2021).

Table (10): The relative price of Egyptian grapes with the price of grapes for the most important competing countries within the most important import markets during (2017-2021).(Price: USD/ton)

Item	Year	UK of Great Britain and Northern Ireland	Netherlands	Russian Federation	UK of Great Britain and Northern Ireland	Netherlands	Russian Federation
UK of Great Britain and Northern Ireland	**Egypt price**	1963.61	2305.68	2060.91	2272.20	2370.07	2194.49
	S-Africa Market	2454.78	2653.23	2360.54	2511.97	2578.20	2511.74
	Relative price	0.799	0.869	0.873	0.905	0.919	0.874
	Spain price	2559.24	2492.57	2342.04	2397.98	2543.76	2467.12
	Relative price	0.767	0.925	0.879	0.948	0.932	0.889
	Chili price	2214.49	2289.65	2192.51	2379.25	2184.49	2252.08
	Relative price	0.887	1.007	0.939	0.955	1.085	0.974
Netherlands	**Egypt price**	1963.87	2306.28	2061.21	2272.24	2370.59	2194.84
	S-Africa Market	2666.87	2853.03	2573.16	2811.26	2659.09	2712.68
	Relative price	0.736	0.808	0.801	0.808	0.892	0.809
	India price	1721.50	2251.73	1936.77	2053.22	1965.83	1985.81
	Relative price	1.141	1.024	1.064	1.107	1.206	1.105
	Peru price	2748.80	2930.25	2712.03	2808.52	2868.35	2813.59
	Relative price	0.714	0.787	0.760	0.809	0.826	0.780
Russian Federation	**Egypt price**	1963.37	2304.83	2059.26	2272.18	2370.48	2194.02
	Turkey price	1021.34	978.07	1040.50	993.58	1023.88	1011.47
	Relative price	1.922	2.357	1.979	2.287	2.315	2.169
	Uzbekistani price	738.78	795.33	918.09	1069.68	960.57	896.49
	Relative price	2.658	2.898	2.243	2.124	2.468	2.447
	Moldova price	916.12	938.56	890.34	1011.97	980.59	947.52
	Relative price	2.143	2.456	2.313	2.245	2.417	2.316

Source:
- Trademap (2022), by: http: // www.trademap.org
- Central Agency for Public Mobilization and Statistics (Capmas) (2022), by: http://www.Capmas.gov.eg
- Food and Agriculture Organization of the United Nations (FAO) (2022), by: http://www.fao.org.
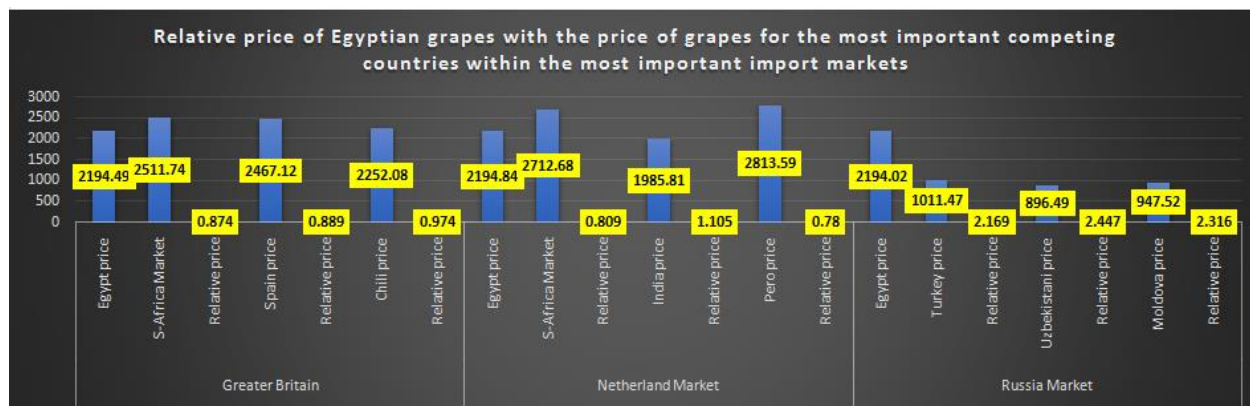
Source: Table (10).

Figure (5): The relative price of Egyptian grapes with the price of grapes for the most important competing countries within the most important import markets during (2017-2021). (Price: USD/ton)

Sixth: The statistical estimation of the global demand functions for Egyptian grapes exports in its most important import markets during the period (2006-2021)

The most important determinants of the global demand for Egyptian grapes exports in its most important import markets (the United Kingdom, the Netherlands, and the Russian Federation) during (2006-2021) by doing the Correlation Matrix between the quantity of Egyptian grapes exports to the imported country (Y) as a dependent variable and the independents variables, which may becan impact on the dependent variable (X,S) and to not face the problem of Multicollinearity between the independents variables, then doing the simple regression in different mathematical forms (Linear, semi-Logarithmic, and double Logarithmic) between the dependent variable and the independents variables, which chosen of the last step, separately to determine the significant variables on the dependent variable by using the coefficient of determination (R^2) and calculated (t-test) values, then doing the statistical estimation to the relation between the dependent variable and the independents variables, which chosen from the second step by using Stepwise Multiple Regression method to identify the best functions, which agree with the economic and statistical aspects according to principles of economic theory and statistical aspects, including: the adjusted coefficient of determination (Adjusted R^2), the significant of the estimated function by using (F-test).

The most important economic factors that are believed to have an impact on the quantity of Egyptian grapes exports to the imported market (Y)-(ton) as a dependent variable in following independents variables; the export price of Egyptian grapes to the importing country (X_1)- (dollar/ton), the export price of grapes to the two competitive countries to Egypt of the importing country's market (X_2, X_3)-(dollar/ton), the total amount of grapes imports to the imported country from the other countries (X_4)-(ton), the total amount of grapes production in the importing country (X_5)-(ton), the average per capita GDP in the importing country (X_6)- (US dollar), the population of the importing country (X_7)-(one million population), and the exchange rate of the Egyptian pound against the dollar (X_8)-(USD/EGP)[15].

1. The global demand function for Egyptian grapes exports in the United Kingdom market:

By studying the relationship between the quantity of Egyptian grapes exports to the United Kingdom (Y_1), & the independents variables that are believed to affect this dependent variable during the period (2006-2021), which are: Export price per ton of Egyptian grapes to the UK market (X_1), Export price per ton of South Africa grapes to the UK market (X_2), Export price per ton of Spanish grapes to the UK market (X_3), Total amount of grapes imports to the UK from the other countries (X_4), The total amount of grapes production in the United Kingdom (X_5), Average per capita GDP in the United Kingdom (X_6), The population of the United Kingdom (X_7), and The exchange rate of the Egyptian LE against the USD (X_8). It shows that the double logarithmic form is the best form which is the equation (1) in Table (11) which accounts the economic aspects and the statistical significance of the function as a whole is at 0.01 based on the (F-test) value, and absence of the Autocorrelation problem according to (D.W) value, which reached about 1.675. The adjusted coeffi. of determination (Adjusted R^2) shows that about 65.3% of the changes in the amount of Egyptian grapes exported to the United Kingdom are due to the independents variables, & 34.7% are due to other factors not included in the demand function – Table (11).

The estimated demand function indicates to the most important factors affect. the quantity of Egyptian grapes exports to the United Kingdom market (Y_1) are; the export price per ton of Spanish grapes (X_3), and the total amount of grapes production in the UK (X_5), as their significance is confirmed at 0.05, which there is a direct correlation between the quantity of Egyptian grapes exports to the United Kingdom, and the export price per ton of Spanish grapes to this market; that is to say, the increase in the export price per ton of Spanish grapes to the United Kingdom of Great Britain and Northern Ireland market by about

1%, leads to an increasing in the exported quantity of Egyptian grapes to this market by about 1.34%, while there is an inverse correlation between the amount of Egyptian grapes exports to the United Kingdom of Great Britain and Northern Ireland market, & the total quantity of grapes production to the United Kingdom; that is to say, the increasing in the total amount of grapes production to the United Kingdom of Great Britain and Northern Ireland market by 1%, leads to a reduction in the exported amount of Egyptian grapes to this market by about 0.80% -Table (11).

Table (11): Results of the statistical estimation of the global demand functions for Egyptian grapes exports in its most important import markets during the period (2006-2021).

No	Market	Demand function	R^{2-}	F	D.W
1	**UK of Great Britain &Northern Ireland**	$\text{Ln } Y_1 = -4.149 + 1.343 \text{ LnX}_3 - 0.802 \text{ LnX}_5$ $(2.289)^* \quad\quad (-2.652)^*$	0.653	7.202**	1.675
2	**Netherlands**	$\text{Ln } Y_2 = -36.609 + 1.281 \text{ LnX}_{11} + 10.687 \text{ LnX}_{15}$ $(2.920)^{**} \quad\quad (3.365)^{**}$	0.776	26.959**	1.481
3	**Russian Federation**	$\text{Ln } Y_3 = -316.199 + 2.544 \text{ LnX}_{17} + 60.552 \text{ LnX}_{22}$ $(3.918)^{**} \quad\quad (4.833)^{**}$	0.701	18.583**	2.193

* Significant at 0.05   ** Sign. at 0.01
- The values between parentheses refers to the calculated (t) values.
Where;
Y_1 : The estimated quantity of Egyptian grapes exports to the UK market per year i (ton).
X_3 :The export price per ton of Spanish grapes to the United Kingdom market per year i (US dollar).
X_5: The total amount of grapes production in the United Kingdom per year i (ton).
Y_2 : The estimated quantity of Egyptian grapes exports to the Netherlands market per year i (ton).
X_{11} :The export price per ton of South Africa grapes to the Netherlands market per year i (US dollar).
X_{15}: The population of the Netherlands per year i (one million population).
Y_3: The estimated quantity of Egyptian grapes exports to the Russian Federation market per year i (ton).
X_{17} :The export price per ton of Turkish grapes to the Russian Federation market per year i (US dollar).
X_{22}:The population of the Russian Federation per year i (one million population).
Source: Results of analyzing the data on the computer by using the SPSS_{V16}.

2. The global demand function for Egyptian grapes exports in the Netherlands market:
By studying the relationships. betw. the quantity of Egyptian grapes exp. to the Netherlands (Y_1), and the independents variables that are believed to affect this dependent variable during the period (2006-2021), which are: the export price per ton of Egyptian grapes to the Netherlands market (X_9), the export price per ton of Peru grapes to the Netherlands market (X_{10}), the export price per ton of South Africa grapes to the Netherlands market (X_{11}), the total amount of grapes imports to the Netherlands from the other countries (X_{12}), the total amount of grapes production in the Netherlands (X_{13}), average per capita GDP in the Netherlands (X_{14}), the population of the Netherlands (X_{15}), and the exch. rate of the Egyptian LE against the USD (X_8). It shown that the double logarithmic form is the best which is the equation (2) in Table (11)

which account the economic aspects and the statistical significance of the function as a whole is at 0.01 based on the (F-test) value, and absence of the Autocorrelation problem according to (D.W) value, which reached 1.481. The adjusted coeffici. of determination (Adjusted R^2) shows that 77.6% of the changes in quantity of Egyptian grapes exported to the Netherlands are due to the independents variables, and 22.4% are due to other factors not included in the demand function.
The estimated demand function indicates to the important factors affect. the quantity of Egyptian grapes exports to the Netherlands (Y_2) are; the export price per ton of South African grapes (X_{11}), and the population of the Netherlands (X_{15}), as their significance is confirmed at 0.01, which there is a direct relationship betw. the quantity of Egyptian grapes exports to the Netherlands, and both of the

export price per ton of South African grapes to this market, and the population of the Netherlands; that is to say, the increase in the export price per ton of South African grapes to the Netherlands market, and the population of the Netherlands by about 1%, leads to an increase in the exported quantity of Egyptian grapes to this market by 1.28%, 10.69%, respectively.

3. The global demand function for Egyptian grapes exports in the Russian Federation market:
By studying the relationship between the quantity of Egyptian grapes exports to the Russian Federation (Y_3), and the independents variables that are believed to affect this dependent variable during the period (2006-2021), which are: the export price of a ton of Egyptian grapes to theRussian Federation market (X_{16}), the export price per ton of Turkish grapes to the Russian Federation market (X_{17}), the export price per ton of Moldova grapes to the Russian Federation market (X_{18}), the total amount of grapes imports to the Russian Federation from the other countries (X_{19}), the total amount of grapes production in the Russian Federation (X_{20}), average per capita GDP in the Russian Federation (X_{21}), the population of the Russian Federation (X_{22}), and the exch. rate of the Egyptian LE against the dollar (X_8). It shown that the double logarithmic form is the best which is the equation (3) in Table (11) which account the economic aspects and the statistical significance of the function as a whole is at 0.01 based on the (F-test) value, and absence of the Autocorrelation problem according to (D.W) value, which reached 2.193. The Adjusted R^2 shows that about 70.1% of the changes in quantity of Egyptian grapes exported to the Russian Federation are due to the independents variables, and 29.9% are due to other factors not included in the demand function.
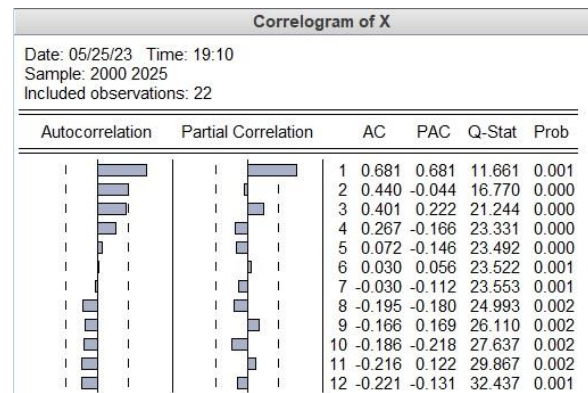
The estimated demand function indicates to the most important factors affecting the quantity of Egyptian grapes exports to the Russian Federation (Y_3) are; the export price per ton of Turkish grapes (X_{17}), and the population of the Russian Federation (X_{22}), as their significance is confirmed at 0.01, which there is a direct relationship between the quantity of Egyptian grapes exports to the Russian Federation, and both of the export price per ton of Turkish grapes to this market, and the population of the Russian Federation; that is to say, the increase in the export price per ton of Turkish grapes to the Russian Federation market, and the population of the Russian Federation by 1%, leads to increasing in the exported quantity of Egyptian grapes to this market by 2.54%, 60.55%, respectively.

Seventh: Forecasting with the quantity of Egyptian grapes exports until 2025 by identifying the best standard methods by using (Box- Jenkins) Model

It is possible to forecasting with the amount of Egyptian grapes exports until 2025 by identifying the standard methods used in forecast. by using (Box-Jenkins) model (Autoregressive Integrated Moving Average (ARIMA) model to ident. possible changes in the potential export policies of the grapes crop, the prediction model contains autoregressive orders of [AR(P)] degree, moving average of error term of [MA(q)] degree, and differences of degree (d)[16].

The methodology for estimating an (ARIMA) model goes through the following stages:
It is clear from the correlogram of the time series data for the quantity of Egyptian grapes exports, that they are non-stationary, as it is shown through the correlogram of autocorrelationand the partial autocorrelation (PAC) for the quantities of Egyptian grapes exports is that the autocorrelation and partial autocorrelation coefficients are significant, which means that non-stationary time series at level, this means accepting the null hypothesis that the sum of the squares of the individual correlations coefficients are significant, as there is serial correlation- Figure (6).

Correlogram of X						
Date: 05/25/23 Time: 19:10						
Sample: 2000 2025						
Included observations: 22						
Autocorrelation	Partial Correlation		AC	PAC	Q-Stat	Prob
		1	0.681	0.681	11.661	0.001
		2	0.440	-0.044	16.770	0.000
		3	0.401	0.222	21.244	0.000
		4	0.267	-0.166	23.331	0.000
		5	0.072	-0.146	23.492	0.000
		6	0.030	0.056	23.522	0.001
		7	-0.030	-0.112	23.553	0.001
		8	-0.195	-0.180	24.993	0.002
		9	-0.166	0.169	26.110	0.002
		10	-0.186	-0.218	27.637	0.002
		11	-0.216	0.122	29.867	0.002
		12	-0.221	-0.131	32.437	0.001

Source: Results of data analysis by using E-views$_{v.12}$ program.
Figure (6): Test of autocorrelation and partial autocorrelation at zero differences of the quantity of Egyptian grapes exports.

Therefore, the first differences should be taken and to repeat the test, as it became clear after taking this differences that the autocorrelation and partial autocorrelation coefficients fell within the unit root, which indicates their non-significance, and the null hypothesis of the presence of a unit root was rejected, which indicates stationary of the time series - Figure (7).
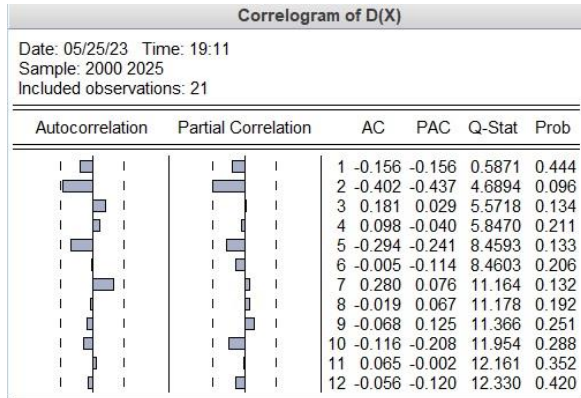
Source: Results of data analysis by using E-views$_{v.12}$ program.
Figure (7): Test of autocorrelation and partial autocorrelation at first differences of the quantity of Egyptian grapes exports.

After conducting the Unit Root test for stationary, which is a test that shows whether the autocorrelation previously discovered in the correlogram test is equivalent to 1 or not, as this test is considered complementary to the previous test, and its basis the level is chosen for the time series or going to the first or second differences, as it was shown through the results of the Augmented Dickey Fuller test (ADF),that ADF test value is greater than the critical value at 0.05, so that the null hypoth. of the existence of unit root is rejected and the alternative hypothesis is accepted. Therefore, stationary time series and the autocorrelation and partial autocorrelation coefficients occur within the unit root, after taking the 1st differences of the time series - Table (12).
It is able to identify the estimated quantity of Egyptian grapes exports model, and it is called the ARIMA model (1,1,1) with the following equation:
D [LOG (X)] = 0.1736 + [AR (1) =- 0.5634, MA(1) = 0.99999]

Table (12): Results of Augmented Dickey Fuller test.

Variable	Level	D$_{(1)}$	D$_{(2)}$
Quantity of Egyptian grapes exports (x)	- 2.064	- 4.865**	- 6.557**
The critical value at 0.05		-3.041	

Source: Results of data analysis by using E-views$_{v.12}$ program.
** Significant at 0.01
D$_{(0)}$ = Level, D$_{(1)}$=1st difference, D$_{(2)}$ = 2nd difference.
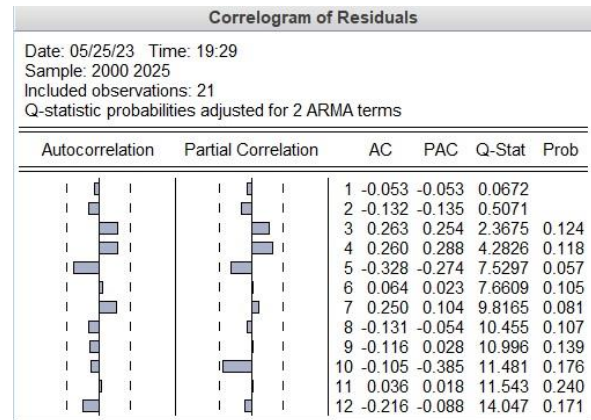
Residual Tests:
Residual tests are used to ensure the quality of the model used in forecasting and that it does not include measurement errors and problems, including

Correlogram Test, White Test, and Normality Test,as it is revealed as follows:
- Through (Correlogram test) of the residuals, obtained the residuals time series are non-significant, which it indicates the stationary model- Figure (8).
- Through (White test)toexamine the Residuals homoscedasticity, it showed the calculated value of (Chi^2) reached about 3.46, which is less than the test critical value at 0.05, and it is non-significance, therefore the null hypothesis is accepted, the residuals series is homoscedasticity- Table (13).
- Through the Normality test for the residuals of the estimated model, shown that (Jarque-Bera) statistic is about 1.04, which is less than the critical value of (Chi^2) distribution is about 31.41 at degrees of freedom = 20, and p-value = 0.594, which is greater than the significance level 0.05,so it is non-significance, therefore the null hypothesis is accepted, that the residuals series follows the normal distribution- Figure (8).

Source: Results of data analysis by using E-views$_{v.12}$ program.
Figure (8): Test of autoregressive and partial autocorrelation of the residuals of the estimated model.

Table (13): Results of White test and Normality test of residuals series.

Statement	White test	Jarque-Bera test
Calculated values	Chi-Squared = 3.46	Jarque-Bera = 1.040
The critical value at 0.05	31.41	31.41

Source: Results of data analysis by using E-views$_{v.12}$ program.

The skewness coefficient reached about 0.377, where its value is limited to between [-3, +3], so the probability distribution of the residuals is moderate, which indicates the symmetry and symmetry of the probability distribution of the residuals, as it turns out

that the probability distribution curve is positively skewed, that means skewed slightly to the right - Figure (9).
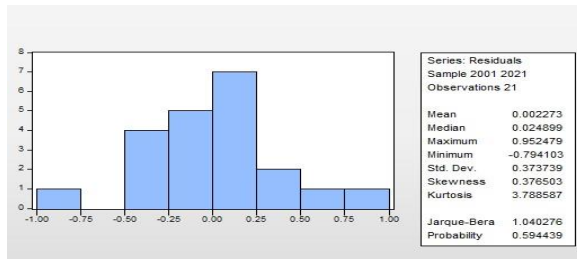
Source: Results of data analysis by using E-views$_{v.12}$ program.
Figure (9): Results of the normality test distribution of the residuals series.

By examining the residuals of the model, it was found that the autocorrelat. between the terms of the random term is not sign., and therefore the model is suitable for estimation. It was found, by examining the estimated model until 2025, that the ARIMA model (1,1,1) is more suitable for forecasting with the quantity of Egyptian grapes exports, through the result of the tests shown in Table (14), as well as through the residuals test of the estimated model, where it was found that the autocorrelation coefficients, partial correlation coefficients, and autocorrelation forms for these residuals all fall within a confidence interval 95%, which means that; autocorrelation between the terms of the random term is not significant, and so the model is very suitable for estimation.

Table (14): Criteria and tests for choosing the best forecasting models by using Box-Jenkins model.

| Variable	ARIMA model	Statistical tests	
		Root M.S.E.	U.Thiel*
Quantity of Egyptian grapes exports	(1, 1, 1)	46.81	0.133

Source: Results of data analysis by using E-views$_{v.12}$ program.
* U-Theil is used to test the extent which the estimated values match the actual values & the extent of their simulation with the reality of the data, as its value ranges between ($0 \leq$ Theil ≤ 1), where there is a complete forecasting when the Theil test value approaches zero.
The results of the criteria and tests for selecting the best models for forecasting with the quantity of Egyptian grapes exports with using the Box-Jenkins methodology until 2025, by using the Theil test and the root mean square error test, which are presented in

Table (14) and Figure (10), showed the validity of the model for forecasting, as it is expect. the amount of Egyptian grapes exp. will increase from 107.3 thousand ton in 2021 to 183.38 thousand ton in 2025, in an increasing estimated at about 76.08 thousand ton, representing about 70.9% compared to 2021- Table (15).
The results also showed that ARIMA model (1,1,1) is the best model for the quantity of Egyptian grapes exports. The results also indicated the efficiency of this model & the estimates of its parameters in the forecasting process based on the residuals (errors) analysis, which the results were as close as possible to actual reality.
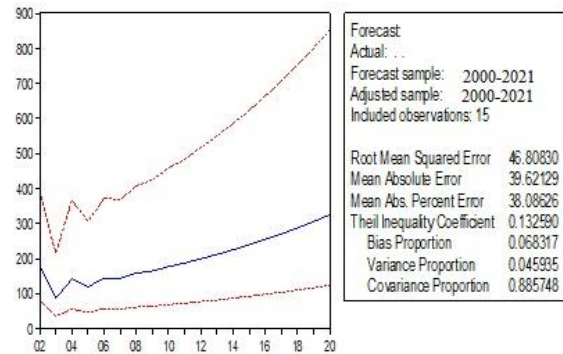
Source: Results of data analysis by using E-views$_{v.12}$ program.
Figure (10): Forecasting for the quantity of Egyptian grapes exports model until 2025.

Table (15): Results of forecasting with the quantity of Egyptian grapes exports until 2025 by using the ARIMA (Box-Jenkins) methodology

Statement	2023	2024	2025
Quantity of Egyptian grapes exports (10^3 tons)	129.58	154.15	183.38
% increase over 2021	20.8	43.7	70.9

Source: Results of data analysis by using E-views$_{v.12}$ program.

Conclusion:
The research had come to some important results can be summarized a; (1) Egypt ranked sixteenth globally in the exported quantity of grapes during the period (2017-2021), where the amount of Egyptian exports of grapes amounted to 108.39 thousand ton, represent. about 2.21% of the quantity of global exports of grapes, amounting to about 4894.06 thousand ton as an average for the same period (2017-2021), while ranked twelfth globally in the value of grapes exp. during the same period, where the value of Egyptian grapes exports amounted to 236.78 million dollars, represent. about 2.71% of the value of world grapes exports,

amounting to about 8722.72 million dollars as an average for the same period. (2) The United Kingdom is considered the most important and largest countries in the world importing Egyptian grapes during (2017-2021), as it ranked first place in the imports of Egyptian grapes with an average amount of imports of about 27.61 thousand ton, representing about 25.47% of total amount of Egyptian exp. of grapes to the world, amounting to about 108.39 thousand ton, and with a value of about 60.44 million USD, representing about 25.53% of total value of Egypt's exports to the world, amount. to 108.39 thousand ton, and with a value of about 60.44 million dollars, representin.g about 25.53% of the total value of Egypt's exports of the grapes, amounting to about 236,78 million dollars as the average for the research period, the Netherlands came in second place, and the Russian Federation came in third place, where the quantity and value of Egyptian exports of grapes to these three markets together represent about 59.29%, 59.40% respectively of the total quantity and value of Egyptian export of grapes as average for the research period. (3)The geographic. concentration coeff. of the quantity and value of Egyptian grapes exports during (2017-2021) amounted to about 38% and 41%, respectively, and thus the geographical concentration coefficient of both the quantity and value of Egyptian grapes exports is relatively low, indicating that it was characterized by geographical concentration, meaning the expansion and diversity of imported foreign markets for Egyptian grapes. (4) An average of coefficient of the revealed comparative advantage of Egyptian grapes export during (2017-2021) is about 14.59; this indicates that Egypt enjoys a revealed comparative advantage of grapes exports in world markets during the average research period, indicating the possibility of increasing the opportunities for Egyptian grapes exports. (5) An average of symmetric revealed comparative advantage index for Egyptian grapes exports during the period (2017-2021) is about 0.871; this indicates that Egypt enjoys a revealed comparative advantage for grapes exports in the world markets, which indicates the possibility of increasing the opportunities for Egyptian grapes exports. (6) An average of penetration rate of Egyptian grapes exports to the United Kingdom market is about 0.035; which indicates that Egyptian exports of grapes to the United Kingdom of Great Britain and Northern Ireland represents about 3.5% of the total amount of apparent consumption of grapes within this market, amounting to about 779.89 thousand ton for the average period (2017-2021), and an average of penetration rate of Egyptian grapes exports to the Netherlands market is about 0.838; which indicates that Egyptian grape exports to the Netherlands represent about 83.8% of the total amount of apparent consumption of grapes within this market

of about 31.18 thousand ton for the average of the same period, while an average of penetration rate of Egyptian grapes exports to the Russian Federation markets about 0.010; which indicates that Egyptian grapes exports to the Russian Federation represent about 1% of the total amount of apparent consumption of grapes within this market of about 998.34 thousand ton for the average of the same period. (7) An average of market share of Egyptian grapes within the UK market is about 10.05% for the average period (2017-2021), and the import capacity of the UK of international grapes (grapes imports from the world) amounted to about 274.70 thousand ton for the average of the same period, while an average of market share of Egyptian grapes within the Netherlands market is about 7.93% for the average of the same period, and the Netherlands import capacity of international grapes amounted to about 328.94 thousand ton for the average of the same period, and an average of market share of Egyptian grapes within the Russian Federation market is about 3.09% for the average of the same period, and the import capacity of the Russian Federation from international grapes amounted to about 336.59 thousand ton for the average of the same period. (8) The ratio betw. the average exp. price of Egyptian grapes to the average export prices of South African, Spanish, and Chilean grapes within the UK market is about 0.874, 0.889, 0.974 respectively, this indicates that Egypt has a competitive price advent. in exporting grapes compared to competing countries within the UK market, and therefore ability of the UK market to absorb as much amount as possible of Egyptian grapes for the average period (2017-2021), and the ratio betw. the average export price of Egyptian grapes to the average export prices of South African grapes, Indian grapes, and Peruvian grapes within the Netherlands market is about 0.809, 1.105, and 0.780 respectively, this indicates that Egypt enjoys a competitive price advent. in exporting grapes compared to competing countries in the Netherlands market except India for the average of the same period, while the ratio between the average export price of Egyptian grapes to the average export price of Turkish, Uzbek, and Moldovan grapes within the Russian Federation market is about 2.169, 2.447, and 2.316 respectively, this indicates that Egypt does not have a competitive price advantage in exporting grapes to the Russian Federation market compared to competing countries, and therefore the inability of the Russian Federation market to absorb as much as possible from Egyptian grapes for the average period (2017-2021).(9) There is a direct correlation between the quantity of Egyptian grapes exports to the UK market, and the export price per ton of Spanish grapes to this market;that is to say,the increase in the export price per ton of Spanish

grapes to the UK market by about 1%, leads to an increasing in the exported quantity of Egyptian grapes to this market by 1.34%, while there is an inverse correlation between the amount of Egyptian grapes exports to the UK market, and the total amount of grapes production to the UK; that is to say, the increase in the total amount of grapes production to the UK market by about 1%, leads to a reduction in the exported amount of Egyptian grapes to this market by 0.80%.(10) There is a direct relationship between the quantity of Egyptian grapes exports to the Netherlands, and both of the export price per ton of South African grapes to this market, and the population of the Netherlands; that is to say, the increase in the export price per ton of South African grapes to the Netherlands market, and the population of the Netherlands by 1%, leads to an increase in the exported quantity of Egyptian grapes to this market by 1.28%, 10.69%, respectively.(11) There is a direct relationship between the quantity of Egyptian grapes exports to the Russian Federation, and both of the export price per ton of Turkish grapes to this market, and the population of the Russian Federation; that is to say,the increase in the export price per ton of Turkish grapes to the Russian Federation market, and the population of the Russian Federation by about 1%, leads to an increase in the exported quantity of Egyptian grapes to this market by 2.54%, 60.55%, respectively. (12) The ARIMA model (1,1,1) is the best model for forecasting with the quantity of Egyptian grapes exports until 2025, whereas it is expected the amount of Egyptian grapes exports will increase from about 107.3 thousand ton in 2021 to about 183.38 thousand ton in 2025, in an increasing estimated at about 76.08 thousand ton, representing about 70.9% compared to 2021.

In light of the findings of the research, it recommended the following: (1) Work to increase the market shares of Egyptian grapes and the penetration rate of Egyptian grapes exports into the markets of importing countries compared to competing countries. (2) Expanding the cultivation of grapes varieties designated for export with the aim of expanding grapes exports to the main markets at the appropriate time according to the needs of those countries and the prices of competing countries. (3) Creating a database to know the absorptive capacity of each market importing Egyptian grapes, in addition to increasing promotional efforts for Egyptian grapes exports to work on opening new markets for export. (4) Improving the performance of the external marketing system by increasing storage capacity at export ports, and identifying oversight and inspection bodies to shorten export procedures.

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