

Econometrics Analysis of External Demand for Egyptian Oranges in the Most Important Global Markets

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ABSTRACT

Egyptian oranges occupy a high relative importance among citrus exports, as the value of their exports amounted to about 91.12% of the total value of citrus exports for the year 2022, which indicates the importance of studying the foreign trade of Egyptian oranges, especially in light of local and global economic changes in an attempt to preserve the role of this crop. In Egyptian agricultural exports and increasing its importance. In general, the research aimed to identify the most important importing markets for the Egyptian orange crop, and to identify the determinants of Egyptian exports from them, based on data for the time period (2003-2022), in addition to identifying the different elasticity of demand, their degree, and the extent of their flexibility or not.

By studying the external demand function for Egyptian oranges, it was found that the price elasticity of demand is less than one for the Russian, Dutch, and Bangladeshi markets, and therefore Egyptian oranges represent a necessary commodity for these countries, while it was greater than one in the Saudi and Chinese markets, i.e. an elastic commodity. Thus, Egyptian oranges are considered a luxury commodity for the Netherlands. As for the transitive elasticity of demand, it was greater than one in all markets, which means that Egypt's orange exports are affected by the prices of competing countries. Also, the income elasticity of demand was greater than one in all markets, which means that demand is more elastic and that Egypt's orange exports are affected by national income in the Saudi market and the Chinese market. Also, the elasticity of the population was greater than one in all markets, which means that the foreign consumer's taste matches Egyptian oranges.

Keywords: Oranges, External Demand Functions, Relative Importance, Value of Exports, global markets.

INTRODUCTION

The Egyptian foreign trade sector is interested in increasing exports in general and increasing agricultural exports in particular in light of the agreements concluded by Egypt with global economic blocs, as it is considered one of the most important economic sectors that contribute to the process of economic development, especially in developing countries, and developing agricultural exports is one of the most important goals of planners. Agricultural economic policies in Egypt, the most important features of which are the expansion and diversification in the production and export of crops in which Egypt enjoys a competitive advantage in global markets, especially vegetable and fruit crops, as the revenues from these exports can be used to fill the gap or deficit existing in the Egyptian trade balance, and citrus fruits are considered one of the crops. Agricultural export, as it ranks first among the production of fruit crops in Egypt, and the value of citrus exports contributes about 8.1% of the total value of Egyptian agricultural exports in 2022, and it also contributes about 0.72% of the total value of Egyptian national exports for the same year.

Egyptian oranges occupy a high relative importance among citrus exports, as the value of their exports amounted to about 91.12% of the total value of citrus exports for the year 2022, which indicates the importance of studying the foreign trade of Egyptian oranges, especially in light of local and global economic changes in an attempt to preserve the role of this crop. In Egyptian agricultural exports and increasing its importance.

RESEARCH PROBLEM

Despite the increasing economic importance of the Egyptian orange crop, Egyptian exports to countries around the world are characterized by instability and differences in the tastes of oranges in the external market. The export price is also considered an essential factor in determining the price elasticity of demand for the most important importing countries to determine whether the commodity is necessary or a luxury for those markets? as well as studying the prices of countries competing with Egypt's orange exports, the national income, and the population of importing countries.

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RESEARCH OBJECTIVES

In general, the research aimed to identify the most important importing markets for the Egyptian orange crop, and to identify the determinants of Egyptian exports from them, based on data for the time period (2003-2022), in addition to identifying the different elasticity of demand, their degree, and the extent of their flexibility or not.

RESEARCH METHOD AND SOURCES OF DATA COLLECTION

To achieve the research objectives, a descriptive analysis method was used, such as the arithmetic average, as well as a quantitative analysis method, where some analysis methods were used, such as estimating general time trend equations, and estimating multiple regression in double logarithmic form through estimating external demand functions. The research relied mainly on secondary data published on the Internet. ITC calculations based on UN COMTRADE and ITC statistics.

RESULTS AND DISCUSSION

The relative importance of the quantity and value of orange exports world:

A- The relative importance of the amount of orange exports around the world:

Table (1) shows the relative importance of the quantity of orange exports across the world during the period (2018-2022), as the average quantity of orange exports worldwide reached about 6,831 thousand tons. Spain ranked first in terms of the quantity of orange exports worldwide, with the average quantity of exports reaching about 1,612 thousand tons, representing about 23.60% of the average quantity of world orange exports, while South Africa ranked second, with the average quantity of exports reaching about 1,264 thousand tons, representing about 18.5% of the average world export quantity, while Egypt came in third place, where the average world export quantity reached about 764 thousand tons, representing about 11.18% of the world's average export quantity, while America came in fourth place, where the average world export quantity reached Oranges exported about 460 thousand tons, representing about 6.74% of the average world export quantity, while Turkey came in fifth place, with an average export quantity of about 309 thousand tons, representing about 4.53% of the average world export quantity of oranges amounting to 6831 thousand tons during Study period (2018-2022).

Table 1. The relative importance of the average quantity of orange exports to the world's most important orange exporting countries, in thousand tons, during the period 2018-2022

Exporters	2018	2019	2020	2021	2022	Average	Relative importance
Spain	1528	1757	1639	1566	1572	1612	23.60
South Africa	1279	1186	1260	1296	1299	1264	18.50
Egypt	774	904	691	738	712	764	11.18
America	505	484	501	467	345	460	6.74
Türkiye	450	239	284	256	317	309	4.53
Greece	314	264	322	329	266	299	4.38
Holland	315	288	310	291	230	287	4.20
Australia	189	208	189	169	151	181	2.65
Portugal	143	114	161	127	140	137	2.01
Iran	58	137	162	137	148	128	1.88
Hong Kong	185	166	118	87	67	124	1.82
Morocco	149	146	108	95	123	124	1.82
Italy	138	109	113	129	96	117	1.71
Chilean	100	100	94	104	81	96	1.41
India	14	55	141	137	89	87	1.27
other countries	875	761	827	898	839	840	12.30
world	7015	6919	6920	6825	6476	6831	100

Source: Compiled and calculated from the Foreign Trade Database. www.trademap.org

Greece, the Netherlands, Australia, Portugal, Iran, Hong Kong, Morocco, Italy, Chile, and India ranked sixth to fifteenth in terms of the amount of orange exports around the world, where the average amount of exports reached about 299 thousand tons. 287 thousand tons, 181 thousand tons, 137 thousand tons, 128 thousand tons, 124 thousand tons, 124 thousand tons, 117 thousand tons, 63 thousand tons, 87 thousand tons, representing about 4.38%, 4.20%, 2.65%, 2.01%, 1.88%, 1.82%, 1.82%, 1.71%, 1.41%, 1.27% for each of them, respectively, from the average amount of world exports of oranges amounting to 6831 thousand tons during the study period.

From the above, it is noted that the amount of orange exports around the world is concentrated in nine countries: (Spain, South Africa, Egypt, America, Turkey, Greece, the Netherlands, Australia and Portugal), about 5,313 thousand tons, which represents about 77.78% of the average amount of orange exports. At the level of countries around the world during the study period (2018-2022).

B- The relative importance of the value of orange exports around the world:

It is clear from Table (2), the relative importance of the value of orange exports across the world during the period (2018-2022), as the average value of orange exports around the world reached about 5,220 million dollars. Spain came in first place in terms of the value of orange exports in the world, with the average value of exports reaching about 1,337 million dollars, representing about 25.61% of the average value of the

world's orange exports, while South Africa came in second place, with the average value of exports reaching about 771 million dollars. million dollars, representing about 14.77% of the average world export value, while the Arab Republic of Egypt came in third place, with the average world export value reaching about 665 million dollars, representing about 12.75% of the average world export value, while America came in fourth place, where The average export value of oranges was about \$567 million, representing about 10.86% of the world's average export value, while the Netherlands came in fifth place, with an average export value of about \$284 million, representing about 5.43% of the average value of the world's orange exports, which amounted to 17,665. One million dollars during the study period (2018-2022).

Australia and Greece came in sixth and seventh place, respectively, where the average value of exports reached about 210 thousand tons, \$161 million, representing about 4.03%, 3.08% of the average value of the world's orange exports. While Italy, Hong Kong, Turkey, Portugal, China, Morocco, Chile, and the UAE came in eighth to fifteenth place in terms of the value of orange exports around the world, about \$129 million, \$118 million, and \$118 million., 110 million dollars, 110 million dollars, 83 million dollars, 76 million dollars, 60 million dollars, representing about 2.47%, 2.26%, 2.26%, 2.11%, 2.11%, 1.59%, 1.45%, 1.15% for each of them, respectively. Of the average value of world orange exports of \$5,220 million during the study period.

Table 2. The relative importance of the average value of orange exports to the world's most important orange exporting countries, in million dollars, during the period 2018-2022

Exporters	2018	2019	2020	2021	2022	Average	Relative importance
Spain	1323	1246	1448	1442	1224	1337	25.61
South Africa	819	667	798	809	763	771	14.77
Egypt	667	662	649	714	636	665	12.75
America	626	527	571	601	509	567	10.86
Holland	296	254	351	277	241	284	5.43
Australia	235	222	215	205	176	210	4.03
Greece	162	126	187	185	144	161	3.08
Italy	138	117	131	146	112	129	2.47
Hong Kong	170	142	109	89	80	118	2.26
Türkiye	161	92	133	105	98	118	2.26
Portugal	118	82	147	100	105	110	2.11
China	108	87	110	155	92	110	2.11
Morocco	84	89	89	68	87	83	1.59
Chilean	84	74	80	81	61	76	1.45
The UAE	49	49	77	62	63	60	1.15
Another	382	392	481	446	404	421	8.06
world	5420	4829	5574	5485	4793	5220	100

Source: Compiled and calculated from the Foreign Trade Database. www.trademap.org

From the above, it is noted that the value of orange exports around the world is concentrated in nine countries: (Spain, South Africa, Egypt, America, the Netherlands, Australia, Greece, Italy and Hong Kong), amounting to about 4242 million dollars, which represents about 81.26% of the average value of orange exports. Oranges worldwide amounted to \$5,220 million during the study period (2018-2022).

The relative importance of the quantity and value of Egyptian orange exports to the most important importing countries:

A- The relative importance of the quantity of Egyptian orange exports to the most important importing countries:

Table (3), shows the relative importance of the quantity of Egyptian orange exports to the most important importing countries during the period (2018-2022), as the average quantity of Egyptian orange exports across Egypt reached about 764 thousand tons. The Russian Federation came in first place in terms of the quantity of Egyptian orange exports across Egypt, with the average quantity of exports reaching about 128.8 thousand tons, representing about 16.86% of the average total quantity of Egypt's orange exports, while Saudi Arabia ranked second with the average quantity of orange exports reaching Egypt about 107.6 thousand tons, representing about 14.08% of the average total

amount of Egyptian orange exports, while China came in third place, as the average amount of Egyptian orange exports reached about 67.8 thousand tons, representing about 8.87% of the average total amount of Egyptian orange exports, while The Netherlands came in fourth place, where the average quantity of Egyptian orange exports reached about 60.5 thousand tons, representing about 7.92% of the total average quantity of Egyptian orange exports, while Bangladesh came in fifth place, where the average quantity of Egyptian orange exports reached about 43.4 thousand tons, which represents about 5.69% of the average total quantity of Egyptian orange exports amounting to 764 thousand tons during the study period (2018-2022).

India, the Emirates, a diverse region, England, Ukraine, Malaysia, Oman, Jordan, Kuwait, and Turkey came in sixth to fifteenth place in terms of the quantity of Egyptian orange exports, where the average quantity of Egyptian orange exports reached about 38.8 thousand tons, 38.5 tons, 28.7 thousand tons, 25.7 thousand tons, 22 thousand tons, 20.8 thousand tons, 17.2 thousand tons, 13 thousand tons, 10.1 thousand tons, 10 thousand tons, representing about 5.08%, 5.04%, 3.76%, 3.37%, 2.87%, 2.73%, 2.25%, 1.70%, 1.32%, 1.30% for each of them, respectively, from the average quantity of Egypt's orange exports amounting to 764 thousand tons during the study period.

Table 3. The relative importance of the average quantity of Egyptian orange exports to Egypt's most important orange exporting countries, in thousand tons, during the period 2018-2022

Importers	2018	2019	2020	2021	2022	Average	Relative importance
Russian Federation	149.1	149.8	127.7	87.9	129.6	128.8	16.86
Saudi Arabia	118.7	128.3	104.8	83.8	102.2	107.6	14.08
China	63.4	141.8	67.6	37.0	29.2	67.8	8.87
Holland	70.9	57.0	71.0	52.0	51.6	60.5	7.92
Bangladesh	34.7	48.6	36.5	44.2	53.3	43.4	5.69
India	42.8	32.0	16.1	54.3	48.7	38.8	5.08
The UAE	39.0	40.4	38.4	29.3	45.6	38.5	5.04
Diverse area	0.0	0.1	0.3	142.8	0.4	28.7	3.76
England	26.9	29.4	23.7	18.3	30.2	25.7	3.37
Ukraine	26.9	32.9	25.0	15.4	9.7	22.0	2.87
Malaysia	22.9	25.1	17.4	14.6	24.1	20.8	2.73
Oman	15.0	18.1	16.3	15.9	20.9	17.2	2.25
Jordan	16.1	15.7	10.9	11.9	10.3	13.0	1.70
Kuwait	13.7	12.2	7.0	7.6	9.9	10.1	1.32
Türkiye	1.1	36.0	3.1	6.7	2.9	10.0	1.30
other countries	133.2	136.8	125.7	116.4	143.6	131.1	17.16
the world	774.4	904.3	691.3	738.1	712.2	764.0	100

Source: Compiled and calculated from the Foreign Trade Database. www.trademap.org

From the above, it is noted that the amount of Egyptian orange exports is concentrated in nine countries: (the European Union, Saudi Arabia, China, the Netherlands, Bangladesh, India, the Emirates, a diverse region, England, and Ukraine), about 561.8 thousand tons, which represents about 73.53% of the average amount of orange exports. Egyptian during the period (2018-2022).

B- The relative importance of the value of Egyptian orange exports to the most important importing countries:

It is clear from Table (4), the relative importance of the value of Egyptian orange exports to the most important importing countries during the period (2018-2022), as the average value of orange exports reached about 665.5 million dollars. The European Union came in first place in terms of the value of Egyptian orange exports, with the average value of exports reaching about 111.7 million dollars, representing about 16.79% of the average total value of Egypt’s orange exports, while Saudi Arabia came in second place, with the average value of exports reaching about 93.4 million dollars, representing about 14.03% of the average total value of Egypt’s orange exports, while China came in third place, as the average value of Egypt’s exports reached about 56.7 million dollars,

representing about 8.52% of the average total value of Egypt’s orange exports, while the Netherlands came in It ranked fourth, as the average value of Egyptian orange exports was about 53.1 million dollars, representing about 7.98% of the average value of Egypt’s total orange exports, while Bangladesh came in fifth place, as the average value of Egypt’s orange exports was about 38 million dollars, representing about 5.71% of the average value of Egypt’s total orange exports amounting to \$799 million during the period (2018-2022).

India and the UAE came in sixth and seventh place, respectively, where the average value of Egypt's orange exports reached about 34.3 thousand tons, \$33.6 million, representing about 5.15%, 5.05% of the average value of Egypt's orange exports. While each diverse region, England, Ukraine, Malaysia, Oman, Jordan, Kuwait, Hong Kong, came in eighth to fifteenth place in terms of the value of exports of Egyptian oranges, about \$27.8 million, \$22.3 million, \$18.8 million, \$18 million, \$, \$15.1 million, \$11.3 million, \$8.7 million, \$8.1 million, representing about 4.18%, 3.36%, 2.83%, 2.41%, 2.27%, 1.69%, 1.31%, 1.22% for each of them, respectively, from the average value Egypt's orange exports amounted to \$665.5 million during the study period (2018-2022).

Table 4. The relative importance of the average value of Egyptian orange exports to the most important countries in the world in million dollars during the period 2018-2022

Importers	2018	2019	2020	2021	2022	Average	Relative importance
Russian Federation	128.3	109.6	119.8	85.1	115.7	111.7	16.79
Saudi Arabia	102.2	93.9	98.3	81.1	91.3	93.4	14.03
China	54.5	103.7	63.4	35.8	26.1	56.7	8.52
Holland	61.0	41.7	66.6	50.3	46.0	53.1	7.98
Bangladesh	29.9	35.6	34.2	42.8	47.6	38.0	5.71
India	36.9	23.4	15.1	52.6	43.4	34.3	5.15
The UAE	33.5	29.6	36.0	28.3	40.7	33.6	5.05
Diverse area	0.0	0.1	0.3	138.2	0.4	27.8	4.18
England	23.2	21.6	22.2	17.7	27.0	22.3	3.36
Ukraine	23.1	24.1	23.4	14.9	8.6	18.8	2.83
Malaysia	19.7	18.4	16.3	14.1	21.5	18.0	2.71
Oman	12.9	13.2	15.3	15.4	18.7	15.1	2.27
Jordan	13.8	11.5	10.2	11.5	9.2	11.3	1.69
Kuwait	11.8	9.0	6.6	7.3	8.9	8.7	1.31
Hong Kong	8.1	9.4	6.0	4.7	12.4	8.1	1.22
other countries	107.5	117.1	114.8	114.4	118.4	114.5	17.20
the world	666.7	661.7	648.6	714.4	635.9	665.5	100

Source: Compiled and calculated from the Foreign Trade Database. www.trademap.org

From the above, it is noted that the value of Egyptian orange exports is concentrated in nine countries: (the European Union, Saudi Arabia, China, the Netherlands, Bangladesh, India, the Emirates, a diverse region, England, and Ukraine), amounting to about \$489.7 million, representing about 768.84% of the average value of orange exports. The amount of \$655.5 million during the study period (2018-2022).

3- Estimating external demand for Egypt's orange exports:

To estimate the external demand for Egyptian oranges for the imported market (QEX), a statistical model was formulated that contains the most important determinants, which are (Egypt's export price to the importing country, the export price of competing countries, the population of the importing country, and the average per capita income of the importing country).

Statistical characterization of the double logit model:

$$\ln QEX_i = \beta_0 + \beta_1 \ln P_{eg} + \beta_2 \ln P_1 + \beta_3 \ln P_2 + \beta_4 \ln P_3 + \beta_4 \ln P_4 + \beta_6 \ln I + \beta_6 \ln POP$$

Where: QEX_i: the quantity of Egyptian exports to the importing country in tons.

P_{eg}: Egypt's export price to the importing country.

P₁: Country 1's export price competing with Egypt.

P₂: Country 2's export price competing with Egypt.

P₃: Country 3's export price competitive with Egypt.

P₄: Country 4's export price competing with Egypt.

I: average income of the importing country.

POP: Population of the importing country.

Through the use of both the stepwise regression method and the correlation matrix between the independent variables under study to get rid of the problem of multicollinearity, many attempts were made to determine the most important statistical models determining the quantity of Egyptian exports to the most important European countries importing Egyptian

$$\begin{aligned} \ln Q_{Russ} = & -254.9 & - \ln 0.94 P_{eg} & + \ln 2.45 P_{Arg} & + \ln 13.64 POP_{Russ} \\ & (-1.11) & (-3.34)** & (6.17)** & (2.12)* \\ & R^2 = 0.78 & & Adj.R^2 = 0.74 & F = 18.8** \end{aligned}$$

where:

Q_{Russ}: The quantity of Egypt's orange exports to the Russian market in tons.

P_{eg}: Egypt's export price of oranges to the Russian market in dollars/ton.

p_{Arg}: Argentina's export price of oranges to the Russian market in dollars/ton.

POP: Population of the Russian market.

Source: Results of statistical analysis of data in Table (1) in the appendices using SPSS.

B-External demand function of the Saudi market for Egyptian orange exports:

oranges (Russia, Saudi Arabia, China). China, Netherlands, Netherlands, and Bangladesh), where the estimation results were as follows:

A. function of the external demand of the Russian market for Egyptian orange exports:

The results of the statistical analysis of the Russian market demand function for Egyptian orange exports during the study period (2003-2022) show that increasing the export price of Egyptian oranges results in a decrease in the quantity of Egypt's orange exports to England by 9.4%, which means that the price elasticity of demand for Egyptian oranges decreases. Although it has a negative slope and is logical from the point of view of economic theory, it is less than one and therefore it is an inelastic demand, meaning that the quantity of exports is not affected by the Egyptian export price.

By increasing the population of the Russian market by 10%, this leads to an increase in the quantity of Egyptian exports of oranges by 136.4%, which means that the derived elasticity for the population is greater than one, and therefore it is a more elastic demand, which means that the taste of the Russian consumer is compatible with Egyptian oranges.

While increasing the price of Argentine exports of oranges to the Russian market by 10%, this leads to an increase in the quantity of Egyptian exports of oranges by 24.5%, which means that the derived cross elasticity is greater than one, and therefore it is a more elastic demand and greatly affects Egypt's exports.

The significance was proven at the level of 0.01, as was the significance of the model as a whole. The results also showed that about 74% of the significant changes in the quantity of orange exports to the Russian market are due to changes in Egypt's export price, Argentina's export price, and the population of the Russian market.

The results of the statistical analysis of the Saudi market demand function for Egyptian orange exports during the study period (2003 - 2022) show that by increasing the price of Spain's export of oranges to the Saudi market by 10%, this leads to an increase in the quantity of Egyptian orange exports by 27.9%, which means that the elasticity of... The derived transit demand for Egyptian orange exports is greater than one, and therefore it is a more elastic demand and is greatly affected by competitive prices.

As is evident, an increase in the national income of the Saudi market by 10% leads to an increase in the

quantity of Egyptian exports of oranges by 19.9%, which means that the derived income elasticity is

greater than one, and therefore it is a more elastic demand and is greatly affected by income.

$$\begin{aligned} \text{Ln } Q_{\text{Saudi}} = & \quad -53.8 & \quad - \text{Ln } 1.21 P_{\text{eg}} & \quad + \text{Ln } 2.79 P_{\text{Spain}} & \quad + \text{Ln } 1.99 I_{\text{Saudi}} \\ & (-4.2)** & (-2.13)* & (4.38)** & (3.41)** \\ & R^2 = 0.87 & \text{Adj.}R^2 = 0.84 & F = 34.98** \end{aligned}$$

where:

Q_{Saudi} : Quantity of Egypt's orange exports to the Saudi market in tons.

P_{eg} : Egypt's export price of oranges to the Saudi market in dollars/ton.

P_{Spain} : Spain's export price of oranges to the Saudi market in dollars/ton.

I_{Saudi} : National income of the Saudi market

Source: Results of statistical analysis of data in Table (2) in the appendices using SPSS.

While increasing the export price of Egyptian oranges to the Saudi market by 10% results in a decrease in the quantity of Egypt's exports of oranges to the Saudi market by 12.1%, which means that the price elasticity of demand for Egyptian oranges, although negative slope and logical from the point of view of economic theory, is less than one and therefore It is an inelastic demand, meaning that the quantity of exports is not affected by the Egyptian export price.

The significance was proven at the level of 0.01, as was the significance of the model as a whole. The

results also showed that about 84% of the changes occurring in the quantity of exports of Egyptian oranges to the Saudi market are due to changes in the export price of Egyptian oranges to the Saudi market, the export price of Spanish oranges to the Saudi market, and income. Saudi nationalist.

C- The external demand function of the Chinese market for Egyptian orange exports:

By studying the external demand function of the Chinese market for Egyptian orange exports, two models were reached as follows:

The impact of Egypt's export price and the national income of the Chinese market:

The results of the statistical analysis of the Chinese market demand function for Egyptian orange exports during the study period (2003 - 2022) show that by increasing Chinese national income by 10%, this leads to an increase in the quantity of Egyptian orange exports by 42.7%, which means that the derived income elasticity is greater than Therefore, it is a more elastic demand and is greatly affected by income.

$$\begin{aligned} \text{Ln } Q_{\text{China}} = & \quad -107.8 & \quad - \text{Ln } 1.71 P_{\text{eg}} & \quad + \text{Ln } 4.27 I_{\text{China}} \\ & (-1.15) & (-5.42)** & (4.54)** \\ & R^2 = 0.78 & \text{Adj.}R^2 = 0.75 & F = 30.03** \end{aligned}$$

where:

Q_{Neth} : The quantity of Egypt's orange exports to the Chinese market in tons.

P_{eg} : Egypt's export price of oranges to the Chinese market in dollars/ton.

I_{China} : China's national income in billion dollars.

Source: Results of statistical analysis of data in Table (3) in the appendices using SPSS.

While increasing the export price of Egyptian oranges by 10% to the Chinese market results in a decrease in the quantity of Egypt's orange exports to the Chinese market by 17.1%, which means that the price elasticity of demand for Egyptian oranges, although negative slope and logical from the point of view of economic theory, is greater than one and therefore It is an elastic demand, meaning that the quantity of exports is affected by the Egyptian export price.

The significance was proven at the level of 0.01, as was the significance of the model as a whole. The results also showed that about 75% of the significant changes in the quantity of exports of Egyptian oranges to the Chinese market are due to changes in both the export price of Egyptian oranges to the Chinese market, and Chinese national income.

2- The impact of Egypt's export price and the population of the Chinese market:

The results of the statistical analysis of the Chinese market demand function for Egyptian orange exports during the study period (2003 - 2022) show that by increasing the population of the Chinese market by 10%, this leads to an increase in the quantity of Egyptian orange exports by 1083%, which means that the derived elasticity of population It is greater than one, and therefore it is a more elastic demand, which means that the taste of the Chinese consumer is compatible with Egyptian oranges.

$$\begin{aligned} \text{Ln } Q_{\text{China}} = & \quad -2258.8 & \quad - \text{Ln } 1.73 P_{\text{eg}} & \quad + \text{Ln } 108.3 \text{POP}_{\text{China}} \\ & (-1.8) & (-7.39)** & (7.32)** \\ & R^2 = 0.88 & \text{Adj.}R^2 = 0.87 & F = 63.78** \end{aligned}$$

where:

Q_{Neth} : The quantity of Egypt's orange exports to the Chinese market in tons.

P_{eg} : Egypt's export price of oranges to the Chinese market in dollars/ton.

POP_{China} : The population of the Chinese market is one million people.

Source: Results of statistical analysis of data in Table (3) in the appendices using SPSS.

While increasing the export price of Egyptian oranges by 10% to the Chinese market results in a decrease in the quantity of Egypt's orange exports to the Chinese market by 17.3%, which means that the price elasticity of demand for Egyptian oranges, although negative slope and logical from the point of view of economic theory, is greater than one and therefore It is an elastic demand, meaning that the quantity of exports is affected by the Egyptian export price.

The significance was proven at the level of 0.01, as was the significance of the model as a whole. The results also showed that about 87% of the significant

$$\begin{aligned} \text{Ln } Q_{Neth} = & \quad -245.5 & \quad - \text{Ln } 0.62 P_{eg} \\ & (-1.29) & \quad (-2.13)^* \\ & R^2 = 0.70 \end{aligned}$$

where:

Q_{Neth} : Quantity of Egypt's orange exports to the Dutch market in tons.

P_{eg} : Egypt's export price of oranges to the Dutch market in dollars/ton.

P_{Spain} : Spain's export price of oranges to the Dutch market in dollars/ton.

POP_{Neth} : The population of the Dutch market is one million people.

Source: Results of statistical analysis of data in Table (4) in the appendices using SPSS.

While increasing the export price of Egyptian oranges by 10% to the Dutch market results in a decrease in the quantity of Egypt's orange exports to the Dutch market by 6.2%, which means that the price elasticity of demand for Egyptian oranges, although negative slope and logical from the point of view of economic theory, is less than one and therefore It is an inelastic demand, meaning that the quantity of exports is not affected by the Egyptian export price.

changes in the quantity of exports of Egyptian oranges to the Chinese market are due to changes in both the export price of Egyptian oranges to the Chinese market, and the population of the Chinese market.

D- The external demand function of the Dutch market for Egyptian orange exports:

The results of the statistical analysis of the Dutch market demand function for Egyptian orange exports during the study period (2003 - 2022) show that by increasing the Spanish export price by 10%, this leads to an increase in the quantity of Egyptian orange exports by 26.9%, which means that the derived transit elasticity for orange crop exports Egyptian oranges are larger than one and therefore have a more elastic demand and are greatly affected by competitive prices.

It is also noted that the population of the Dutch market has increased by 10%, which leads to an increase in the quantity of Egyptian exports of oranges by 162.2%, which means that the derived elasticity for the population is greater than one, and therefore it is a more elastic demand, which means that the taste of the Dutch consumer is compatible with Egyptian oranges.

$$\begin{aligned} & + \text{Ln } 2.69 P_{Spain} & + \text{Ln } 16.22 POP_{Neth} \\ & (1.94)^* & (2.30)^* \\ \text{Adj.}R^2 = 0.64 & & F = 12.14^{**} \end{aligned}$$

The significance was proven at the level of 0.01, as was the significance of the model as a whole. The results also showed that about 64% of the significant changes in the quantity of exports of Egyptian oranges to the Netherlands are due to changes in the export price of Egyptian oranges to the Dutch market, the export price of Spain, and the population of the Dutch market.

E- External demand function of the Bangladeshi market for Egyptian orange exports:

The results of the statistical analysis of the Bangladesh market demand function for Egyptian orange exports during the study period (2003 - 2022) show that by increasing the Australian export price to the Bangladesh market by 10%, this leads to an increase in the quantity of Egyptian orange exports by 53.6%, which means that the derived cross elasticity Exports of the Egyptian orange crop are greater than one, and therefore it is a more elastic demand and is greatly affected by competitive prices.

$$\text{Ln}Q_{\text{Bang}} = -663.5 \text{ } (-9.2)** \text{ } - \text{Ln} 0.98 P_{\text{eg}} \text{ } (-7.64)** \text{ } + \text{Ln} 5.36 P_{\text{Aust}} \text{ } (1.92)* \text{ } + \text{Ln} 37.09 \text{ POP}_{\text{Bang}} \text{ } (8.99)**$$

$R^2 = 0.96$ $\text{Adj.}R^2 = 0.95$ $F = 131.29**$

where:

Q_{Bang} : Quantity of Egypt's orange exports to the Bangladeshi market in tons.

P_{eg} : Egypt's export price of oranges to the Bangladeshi market in dollars/ton.

P_{Aust} : Australia export price of oranges to Bangladesh market in \$/ton.

POP_{Bang} : Population of Bangladesh market in million.

Source: Results of statistical analysis of data in Table (4) in the appendices using SPSS.

Table 5. Summary of price, transit, and income elasticities of Egypt’s orange exports to the most important European markets

Market	Price elasticity	Cross elasticity	Income elasticity	Population elasticity
Russian	-0.94	2.54 Arg		13.64
Saudi	1.21	2.79 Spain	1.99	
Chinese	1.71		4.27	108.3
Dutch	0.62	2.69 Spain		16.22
Bangladesh	0.98	5.36 Aust		37.09

Source: Results of statistical analysis of external demand functions for Egyptian oranges.

It is noted from Table (5) that the price elasticity of demand is less than one for the Russian, Dutch, and Bangladeshi markets, and therefore Egyptian oranges represent a necessary commodity for these countries, while it was greater than one in the Saudi and Chinese markets, i.e. an elastic commodity, and thus Egyptian oranges are considered a luxury commodity for the Netherlands.

As for the transitive elasticity of demand, it was greater than one in all markets, which means that Egypt’s orange exports are affected by the prices of competing countries.

Also, the income elasticity of demand was greater than one in all markets, which means that demand is more elastic and that Egypt’s orange exports are affected by national income in the Saudi market and the Chinese market.

Also, the population elasticity was greater than one in all markets, which means that the taste of the Bangladeshi consumer is consistent with Egyptian oranges.

RECOMMENDATIONS

Through the results of the statistical analysis of the research data, several recommendations were reached to

promote Egyptian orange exports, which we explain as follows:

- 1- The price elasticity of demand is lower than one (inelastic demand) in the Russian, Dutch, and Bangladeshi markets for Egyptian oranges, which means that Egyptian oranges for those countries are of great importance, such that the attempt of these countries to reduce the quantities of their exports from Egypt by increasing the export price is weak, which gives an opportunity It is important for Egypt to increase its export share of Egyptian frozen strawberries to those countries.
- 2- The price elasticity of demand is higher than one (elastic demand) for Egyptian oranges for the Saudi and Chinese markets, which means that these countries have the ability to reduce the quantities of their exports from Egypt of Egyptian oranges and import from countries competing with Egypt when the price of Egyptian exports increases, which requires attention to that. Countries are trying to increase their Egyptian market share by following appropriate and encouraging price and marketing policies.
- 3- Through the population regression coefficient, it is clear that Egyptian oranges are compatible with the taste of foreign consumers, which encourages Egypt to search for opening new markets for Egyptian oranges and to pay attention to and maintain their quality.

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المخلص العربي

تحليل اقتصادي قياسي للطلب الخارجي علي البرتقال المصري في أهم الأسواق العالمية

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من السوق الروسي والهولندي والبنجلاديش، وبالتالي فإن البرتقال المصري يمثل سلعة ضرورية لهذه الدول، بينما كانت أكبر من الواحد في كل من السوق السعودي والصيني أي أنه يعتبر سلعة مرنة وبالتالي فيعتبر البرتقال المصري سلعة كمالية لهذه الدول. أما بالنسبة لمرونة الطلب العبورية كانت أكبر من الواحد في جميع الأسواق، مما يعني أن صادرات مصر من البرتقال تتأثر بأسعار الدول المنافسة. كما أن مرونة الطلب الداخلية كانت أكبر من الواحد في جميع الأسواق، مما يعني أن الطلب عليه مرناً، وأن صادرات مصر من البرتقال تتأثر بالدخل القومي في السوق السعودي والسوق الصيني. كما أن مرونة عدد السكان كانت أكبر من الواحد في جميع الأسواق، مما يعني توافق الذوق لمستهلك الخارجي مع البرتقال المصري.

الكلمات المفتاحية: البرتقال، دوال الطلب الخارجي، الأهمية النسبية، قيمة الصادرات، الأسواق العالمية.

يحتل محصول البرتقال المصري أهمية نسبية مرتفعة من الصادرات الزراعية المصرية من الموالح، حيث بلغت قيمة صادراته حوالي ٩١,١٢% من إجمالي قيمة صادرات مصر من الموالح لعام ٢٠٢٢، الأمر الذي يشير إلي أهمية تناول التجارة الخارجية للبرتقال المصري بالدراسة وخاصة في ظل التغيرات الاقتصادية المحلية والعالمية في محاولة للمحافظة علي دور هذا المحصول في الصادرات الزراعية المصرية وزيادة أهميته. حيث استهدف البحث بصفة عامة التعرف علي أهم الأسواق المستوردة لمحصول البرتقال المصري، والتعرف علي محددات الصادرات المصرية منها وذلك اعتماداً علي بيانات الفترة الزمنية (٢٠٠٣-٢٠٢٢)، بالإضافة إلي التعرف علي مرونة الطلب المختلفة ودرجتها ومدى مرونتها من عدمه.

ومن خلال دراسة دالة الطلب الخارجي علي البرتقال المصري تبين أن مرونة الطلب السعرية أقل من الواحد لكل

APPENDIX

Table 1. Development of the quantity of Egyptian orange exports to Russia and the factors affecting external demand during the time period 2003-2022**(Quantity of exports: tons, export price: \$/ton, national income: \$1 billion, population: million people)**

Years	Quantity of exports	Egypt's export price	South Africa's export price	Turkey's export price	Argentina's export price	Morocco's export price	Russia's national income	Russia's population
2003	74254	235	392	278	393	381	374.0	144.6
2004	55909	318	480	314	476	401	490.9	144.1
2005	74983	339	521	464	520	520	638.6	143.5
2006	39953	342	607	532	547	525	830.5	143.0
2007	68561	356	612	601	603	617	1079.9	142.8
2008	96155	676	834	701	758	674	1368.0	142.7
2009	129397	659	862	851	860	844	1318.5	142.8
2010	158076	618	865	889	866	856	1425.2	142.8
2011	225888	546	935	895	949	935	1581.3	143.0
2012	130158	751	923	862	959	957	1931.7	143.2
2013	238717	486	932	970	943	940	2179.4	143.5
2014	207970	450	903	773	978	961	2138.0	143.8
2015	153837	696	891	645	974	929	1725.2	144.1
2016	147726	717	905	645	899	901	1426.9	144.3
2017	121107	747	922	589	943	927	1352.3	144.5
2018	149072	861	943	589	936	872	1505.2	144.5
2019	149787	732	928	659	954	887	1655.6	144.4
2020	127714	938	922	706	952	901	1575.0	144.1
2021	87946	968	933	657	960	911	1723.8	144.1
2022	129574	893	933	672	961	924	1870.6	144.2
المتوسط	128339.2	616.4	812.2	664.6	821.6	793.2	1409.5	143.7

Source: Collected and calculated from the official website WWW.TRADEMAP.ORG

Table 2. Development of the quantity of Egyptian orange exports to Saudi Arabia and the factors affecting external demand during the time period 2003-2022**(Quantity of exports: tons, export price: \$/ton, national income: billion dollars, population: million people)**

Years	Quantity of exports	Egypt's export price	South Africa's export price	Spain's export price	Morocco's export price	Syria's export price	Saudi Arabia's national income	Saudi Arabia's population
2003	2614	210	332	276	625	467	212.9	23.2
2004	985	272	329	289	784	333	255.4	23.7
2005	4071	304	425	329	795	331	301.4	24.4
2006	16077	323	453	621	803	342	347.0	25.4
2007	9396	371	513	739	817	341	398.0	26.4
2008	139847	676	595	1248	828	515	477.9	27.4
2009	175292	659	525	973	735	659	476.6	28.5
2010	185048	583	583	984	927	366	514.2	29.4
2011	218685	492	672	902	926	381	595.4	30.2
2012	118923	751	643	829	787	425	706.7	30.8
2013	215440	391	651	796	878	473	771.6	31.5
2014	308119	278	640	774	1177	722	800.3	32.1
2015	138262	696	616	745	808	612	767.3	32.7
2016	128321	717	704	892	818	419	721.6	33.4
2017	102820	747	746	955	726	398	686.8	34.2
2018	118744	861	735	1157	887	356	766.1	35.0
2019	128269	732	734	777	762	355	830.4	35.8
2020	104766	938	873	1007	916	328	807.3	36.0
2021	83794	968	829	1065	719	358	863.7	36.0
2022	102203	893	693	927	900	223	1007.7	36.4
المتوسط	115083.8	593.1	614.6	814.3	830.9	420.2	615.4	30.6

Source: Collected and calculated from the official website WWW.TRADEMAP.ORG

Table 3. Development of the quantity of Egypt's exports of Egyptian oranges to China and the factors affecting external demand during the time period 2003-2022**(Quantity of exports: tons, export price: \$/ton, national income: \$1 billion, population: million people)**

Years	Quantity of exports	Egypt's export price	South Africa's export price	Australia's export price	Germany's export price	Netherlands's export price	China's national income	China's population
2003	135	200	553	506	560	723	1648.3	1288.4
2004	25	280	712	643	714	706	1959.6	1296.1
2005	57	276	676	660	713	651	2295.1	1303.7
2006	73	247	680	696	667	700	2706.6	1311.0
2007	860	407	778	702	856	749	3310.3	1317.9
2008	371	677	940	931	815	798	4104.2	1324.7
2009	270	659	770	800	713	847	4901.3	1331.3
2010	127	710	994	910	959	896	5801.9	1337.7
2011	745	400	1247	1279	1037	945	6783.9	1345.0
2012	105	752	1073	1218	1159	1609	8006.1	1354.2
2013	972	542	1124	1480	1219	1750	9193.8	1363.2
2014	8439	542	1109	1622	1212	1876	10246.6	1371.9
2015	16026	696	972	1542	1209	1760	10883.2	1379.9
2016	22819	717	1006	1520	1141	1768	11387.9	1387.8
2017	71460	747	955	1520	1294	1789	12104.9	1396.2
2018	63350	861	942	1715	1400	1810	13385.5	1402.8
2019	141759	732	917	1453	1305	1831	14512.9	1407.7
2020	67559	938	1023	1609	1408	1852	14843.8	1411.1
2021	36965	968	1017	1636	1523	1873	16883.6	1412.4
2022	29228	893	1004	1564	1797	1894	18151.7	1412.2
المتوسط	23067.3	612.2	924.6	1200.3	1085.1	1341.4	8655.6	1357.8

Source: Collected and calculated from the official website WWW.TRADEMAP.ORG

Table 4. Development of the quantity of Egyptian orange exports to the Netherlands and the factors affecting external demand during the time period 2003-2022**(Quantity of exports: tons, export price: \$/ton, national income: \$1 billion, population: million people)**

Years	Quantity of exports	Egypt's export price	South Africa's export price	Spain's export price	Germany's export price	Belgium's export price	Netherlands's National income	Netherlands's Population
2003	3533	263	620	822	683	793	491.5	16.2
2004	10468	343	576	894	624	597	596.4	16.3
2005	31683	360	623	712	623	816	684.8	16.3
2006	14851	357	897	692	742	777	740.0	16.3
2007	13807	383	838	853	1050	954	796.5	16.4
2008	15201	676	822	822	822	822	849.8	16.4
2009	39096	659	875	746	934	708	864.7	16.5
2010	33527	643	761	792	877	752	887.7	16.6
2011	27354	506	805	762	803	962	895.7	16.7
2012	27663	751	892	877	895	1249	862.9	16.8
2013	54600	445	844	836	829	1940	872.1	16.8
2014	55551	388	788	720	790	847	870.3	16.9
2015	32721	696	767	773	844	909	835.2	16.9
2016	54486	717	884	716	862	851	791.6	17.0
2017	66169	747	840	822	1024	925	792.7	17.1
2018	70896	861	848	752	939	846	870.9	17.2
2019	56962	732	1001	824	1159	1082	900.8	17.3
2020	70959	938	825	905	1003	953	875.1	17.4
2021	51995	968	896	842	932	852	1019.9	17.5
2022	51570	893	967	779	861	751	1066.1	17.7
المتوسط	39154.6	616.3	818.5	797.1	864.8	919.3	828.2	16.8

Source: Collected and calculated from the official website WWW.TRADEMAP.ORG

Table 5. Development of the quantity of Egyptian orange exports to Bangladesh and the factors affecting external demand during the time period 2003-2022**(Quantity of exports: tons, export price: \$/ton, national income: \$1 billion, population: million people)**

Years	Quantity of exports	Egypt's export price	South Africa's export price	India's export price	Pakistan's export price	Australia's export price	Bangladesh's national income	Bangladesh's population
2003	35	220	319	554	325	359	62.2	136.5
2004	68	252	479	313	478	348	69.5	138.8
2005	70	371	442	441	376	500	76.6	140.9
2006	114	326	287	373	293	478	80.9	142.6
2007	1530	335	380	361	358	409	86.3	144.1
2008	2192	676	381	413	384	384	95.7	145.4
2009	5487	659	379	405	381	381	106.1	146.7
2010	9001	655	378	398	379	379	118.3	148.4
2011	25359	596	382	408	380	376	133.3	150.2
2012	17578	751	380	416	377	378	146.9	152.1
2013	28966	532	378	415	377	389	158.8	154.0
2014	38540	522	389	400	352	360	171.2	156.0
2015	26025	696	406	414	410	411	191.3	157.8
2016	35723	717	482	490	468	462	225.6	159.8
2017	41241	747	558	566	526	513	266.7	161.8
2018	34734	861	634	642	584	564	329.9	163.7
2019	48585	732	710	718	642	615	366.5	165.5
2020	36465	938	786	794	700	666	385.2	167.4
2021	44194	968	862	870	758	717	435.5	169.4
2022	53264	893	938	946	816	768	483.4	171.2
المتوسط	22458.6	622.4	497.5	516.9	468.2	472.9	199.5	153.6

Source: Collected and calculated from the official website WWW.TRADEMAP.ORG