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An economic study of the current situation of Egyptian potato exports

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Abstract: The research aimed to study the competitiveness of Egyptian potatoes in foreign markets, using some economic indicators such as the efficiency of the performance of export operations, the coefficient of price competitiveness, the market share, the coefficient of instability, and the gravity calculation equations. Russia, the United Arab Emirates, the United Kingdom, Germany, Lebanon, and Greece) that an increase in the gross domestic product of the group of countries together by 10% will lead to an increase in the amount of Egyptian potato exports to these countries by 23.30%, and an increase in the total value of the Egyptian domestic product by 10%. % will lead to an increase in the quantity of Egyptian potato exports to the group of selected countries by 23.50%, as it was found that when increasing the distance between Egypt and these countries by 10%, it will lead to a decrease in the quantity of Egyptian potato exports to these countries by 35%, as the significant effect was proven The positive effect of the language on the quantity of Egyptian exports of the potato crop during the study period (2005-2021), as the gravity data using the modified model indicates that an increase in the per capita share of the Egyptian GDP by 10% will lead to an increase in the amount of Egyptian potato exports to these countries by 23.50. %, and an increase in the per capita share of the Egyptian GDP by 10% will lead to an increase in the quantity of potato exports to the selected countries by 21%, and when the distance between Egypt and any country increases by 10%, this will result in a decrease in the amount of exports. between them by 35.30%, and the positive effect of language on the quantity of potato exports during the same period was significant.
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Introduction:

Export is an essential element for achieving economic growth, as it is an essential component of the state's foreign exchange earnings, which is necessary to finance economic development programs, as agricultural exports are considered one of the most important items of Egyptian exports [15]. The potato crop is considered one of the most important export crops in Egypt, reaching The value of its exports amounted to about $233.49 million for the average period (2017-2021), representing about 9.70% of the total value of agricultural exports, amounting to about $2408.20 million for the average period (2017-2021) [12].

The study Problem:

Despite the importance of the export potato crop, its exports are characterized by fluctuation and instability, in addition to its low growth rate.

Search goal:

The research aimed to identify the competitiveness of Egyptian potatoes in foreign markets, by studying the following sub-objectives:

1- Studying the productive status of the potato crop in Egypt

2- Studying the development of Egypt's exports and imports of the potato crop

3- Studying the Egyptian competitive position of potatoes in the global markets compared to some other potato exporting countries.

4- Studying the most important importing countries of the potato crop from Egypt, and the most important factors affecting the quantity exported.

Method:

The study used some statistical and mathematical methods such as averages, percentages, and regression using the ordinary least squares method to measure the temporal trend of some variables under study, in addition to some indicators of competitiveness, which are represented in [1]:

1- Efficient performance of export operations:

This indicator represents one of the most important economic indicators for measuring the efficiency of export systems, policies, bodies and

institutions within the country and their ability to complete export procedures. This indicator is calculated as follows [13]:

Efficiency of performing export operations = (the value of the country's export trade / national income of the same country) x 100

2- Price competitiveness:

The export price is one of the most important factors that help in penetrating more foreign markets. The lower the export price of the country under consideration compared to other competing countries, this indicates that there is a price advantage for the commodity from that country and a higher competitive ability [7], and it is estimated as follows [6]:

Price competitiveness coefficient = (the export price of the crop / the export price of the same crop in the competing country) X 100

3- Market share:

This measure reflects the country's ability to increase its exports of a particular commodity to the global market or to the market of another country, as increasing the volume of exports is a major goal for any country, and it is measured by the share of the country's exports in the global market or in any of the import markets on the basis that increasing This percentage or its decrease over time is related to the extent of improvement or decline in competitiveness, and the market share is measured by the following equation [5]:

MSHji = (Xjci/Mcwi) × 100

Where:

MSHji = the country's market share of a given commodity.

Xjci = the country's exports to a particular country of a particular commodity.

Mcwi = total country imports from the world of a given commodity.

4- Coefficient of instability:

Those familiar with the data of Egyptian agricultural exports, whether fresh or processed, notice that they are often unstable. This may be due to relying on the principle of exporting a surplus beyond the need of the local market and not production destined for export, complete stability is achieved if the value of the stability coefficient is equal to zero, but if it is more than zero with neglect of the sign, this indicates instability [11], and this indicator is calculated as follows [9]:

$St = \frac{|Yi - \hat{Y}i|}{\hat{Y}i} * 100$

Where:

St = coefficient of instability for the variable under study.

Yi = the actual value.

$\hat{Y}i$ = estimated value.

5- Gravity model:

The gravitational model is based primarily on Isaac Newton's law, which indicates that the gravitational force (F) between two bodies is direct with the product of their masses (M1, M2) and inversely with the square of the distance between the center of the two bodies (D2). By applying this theory in the economic field, it will be as follows [10]:

Newton $F = G\frac{M_1 M_2}{D^2} (1) \Rightarrow$

Jan Tinbergen $Y_{ij} = G\frac{M_i M_j}{Dist_{ij}} (2)$

Equation (2) has been formulated to turn into an exponential equation, as in the following equation:

$$Y_{ij} = B_0 GDP_i^{B_1} GDP_j^{B_2} Dist_{ij}^{-B_3} (3)$$

Adding the logarithm, the equation becomes:

$\text{Ln } Y_{ij} = B_0 + B_1 \text{ Ln } GDP_i + B_2 \text{ Ln } GDP_j - B_3 \text{ Ln } Dist_{ij} + e_{ij}$ (4)

Where: the gross domestic product in the two countries GDPj & GDPi

The distance between the two countries indicates Distij

The random variable denotes eij

Equation (4) and the BGM are called the "Basic Gravity Model"

In 1966 [Linneman] added the two countries' populations to the basic model equation and called it the "Augmented Gravity Model" (AGM).

$\text{Ln } Y_{ij} = B_0 + B_1 \text{ Ln Pc } GDP_i + B_2 \text{ Pc } GDP_j - B_3 \text{ Ln } Dist_{ij} + e_{ij}$ (5)

To apply the model, cross-sectional data should not exceed the number of years of the time series.

The study used the gravity model with two forms (basic and modified). When estimating the basic model, the following data were entered:

The gross domestic product of Egypt (as an exporting country), The gross domestic product of the importing countries, and the distance between the ports of those countries and the ports of Egypt, and a dummy variable (Dij) was used, which is the common language between countries, as that variable takes values between (1, zero).

When estimating the modified model, data on the per capita GDP in Egypt were used, as well as the per capita GDP of the importing countries with distance and the imaginary coefficient (language).

Results:

1- Productivity Indicators:

This part of the study presents the development of each of the cultivated area, the feddan

productivity, and the total production of potato loops in Egypt for the period (2005-2021), and the results are as follows:

1- The evolution of the total loops of the potato crop in Egypt for the period (2005-2021):

It is clear from the data of Table (1) that the area cultivated with potatoes during the study period was the lowest amount of about 220.20 thousand feddans in 2006 and the highest amount of about 516.40 thousand feddans in 2020, and the average of the total cultivated area of potatoes was approximately 379.49 thousand feddans.

The table also indicates that the per-feddan productivity of the potato crop was the lowest value of about 10.50 tons/feddan in 2006, and the highest value of about 12.48 tons/feddan in 2021, and the average per-feddan productivity was approximately 11.38 tons/feddan.

The production index is considered a mirror that reflects the development of both the cultivated area and the feddan productivity, as the minimum level of total production reached about 2312.79 thousand tons in 2006, the largest quantity was about 6427.12 thousand tons in 2020, and the average total production during the study period was about 4343.83 thousand tons.

And through the data of Table (2), which shows the development of each of the cultivated area, feddans productivity, and the total production of the potato crop during the study period, it was found that there was a statistically significant increase in the area cultivated with the potato crop at a significant level of 0.01 estimated at about 13.81 thousand feddans, With a rate of change estimated at about 3.64% from its annual average of about 379.49 thousand feddans.

It is also clear that there is a statistically significant increase in the productivity of the feddan at a significant level of 0.01 estimated at about 0.11 tons / feddan, an increase of about 0.97% over its annual average of about 11.38 tons / feddan.

Table (1) the evolution of some productive determinants of the total loops of the potato crop in Egypt during the period (2005-2021).

Year	cultivated area (thousand feddans)	Productivity (ton/ feddan)	production quantity (thousand tons)
2005	300.66	10.53	3167.43
2006	220.20	10.50	2312.79
2007	257.03	10.74	2760.46
2008	327.42	10.89	3567.05
2009	329.21	11.89	3659.28
2010	334.64	10.86	3634.22
2011	390.81	11.10	4338.43
2012	421.88	11.27	4758.04
2013	381.38	11.18	4265.18
2014	409.54	11.26	4611.07
2015	437.39	11.33	4955.45
2016	376.63	10.92	4113.44
2017	414.86	11.67	4841.04
2018	408.08	12.16	4960.06
2019	422.62	12.31	5200.19
2020	516.40	12.45	6427.12
2021	502.55	12.48	6273.93
average	379.49	11.38	4343.83

Source: Calculated from separate issues of the Agricultural Statistics Bulletin of the Economic Affairs Sector of the Ministry of Agriculture and Land Reclamation.

Table (2) Parameters for estimating the general temporal trend of the production variables of the total Egyptian potato loops for the period (2005-2021).

phenomenon	temporal direction	(R^2)	(F)	Average	%
Cultivated area (Thousand feddans)	Yi = 255.19 + 13.81 Xi (7.64)**	0.80	58.29**	379.49	3.64
Feddan yield (ton)	Yi = 10.40 + 0.11 Xi (6.02)**	0.71	36.20**	11.38	0.97
Total production (thousand tons)	Yi = 2523.82 + 202.22 Xi (9.12)**	0.85	83.19**	4343.83	4.66

Where: Y_i = indicates the estimated value of the phenomenon. X_i = the time factor, where i = (1, 2, 3,....., 17) in years.

The value in brackets expresses the calculated (t) value, ** Significant at 0.01 level.

Source: Collected and calculated from the data of Table (3).

The total production of the potato crop took a general trend of statistically significant increasing at a significant level of 0.01. The amount of this increase amounted to about 202.22 thousand tons, an increase rate estimated at about 4.66% over its annual average of about 4343.83 thousand tons during the study period, as shown in the same previous table.

2- Some export indicators for the potato crop in Egypt:

By studying the development of the quantity of Egyptian exports of potatoes during the period (2005-2021), it is clear from the data of Table (3), that the quantity of potato exports fluctuated between 183.90 thousand tons in 2006 as a minimum and 787.75 thousand tons as a maximum in 2017, while The average quantity of Egyptian potato exports during that period was about 445.11 thousand tons.

As shown by the data of the same previous table, the value of Egyptian exports of potatoes fluctuated between $65.35 million in 2006 as a minimum and $326.79 million as a maximum in 2014, while the average value of Egyptian exports amounted to about $185.27 million during the period (2005-2021).

And by examining the development of the price of a ton of Egyptian exports of the potato crop during the period (2005-2021), in the same previous table as well, it is clear that the price of a ton of potatoes was about $258.82 in 2005 as a minimum, while the price of a ton was about $622.34 in 2008 as a maximum, while the average price of a ton of Egyptian potatoes was about $424.78 during the study period.

By estimating the general time trend equations for the development of the quantity of Egyptian exports of potatoes shown in Table (4), it is clear that the quantity of exports increased statistically significantly at a significant level of 0.01. The annual increase amounted to about 24.03 thousand tons, which is equivalent to about 5.4% of the average quantity Exports during the study period, and the coefficient of determination (R^2) indicates that the time component is responsible for about 42% of the changes occurring in the quantity of Egyptian exports.

And by estimating the general time trend equation for the value of Egyptian exports of potatoes during the period (2005-2021), it is clear that it increased statistically significantly at a significant level of 0.01. The annual increase amounted to about $9.69 million, which is equivalent to about 5.23% of the average value of Egyptian exports of potatoes. During that period, the coefficient of determination shows that the time factor is responsible for about 45% of the changes in the value of potato exports.

By estimating the general time trend equation for the price of a ton of potatoes, it is clear from the same data in the previous table that it did not prove significant changes in the price of a ton of exported potatoes.

Indicators related to the competitiveness of Egyptian potatoes in the international markets:

Several indicators that reflect the competitiveness of Egyptian potatoes in foreign markets have been estimated according to the following:

Table (3) Evolution of the quantity, value and price per ton of Egyptian exports of potatoes during the period (2005-2021)

Year	Export amount (thousand tons)	Export value (Million dollars)	Price per ton (dollars)
2005	299.71	77.57	258.82
2006	183.90	65.35	355.36
2007	260.14	108.10	415.55
2008	263.12	163.75	622.34
2009	285.04	145.91	511.89
2010	299.96	131.90	439.73
2011	637.43	250.65	393.22
2012	262.96	127.35	484.29
2013	427.91	205.90	481.18
2014	684.69	326.79	477.28
2015	714.47	231.67	324.25
2016	361.13	147.15	407.47
2017	787.75	272.14	345.46
2018	502.86	206.91	411.47
2019	561.97	266.26	473.80
2020	561.36	221.95	395.38
2021	472.45	200.20	423.75
average	445.11	185.27	424.78

Source: Compiled and calculated from data:
Central Agency for Public Mobilization and Statistics, Foreign Trade Database, 2022

Table (4) Time trend of export variables for the period (2005-2021).

Phenomenon	The equation	(R^2)	(F)	Average	%
Export amount (thousand tons)	Y_i = 228.85 + 24.03 X_i (3.30) **	0.42	10.91**	445.11	5.40
Export value (Million dollars)	Y_i = 98.04 + 9.69 X_i (3.52)**	0.45	12.41**	185.27	5.23
Per ton export price (dollar)	Y_i = 425.06 - 0.03 X_i (-0.01)	-	-	424.78	-

Where: Y_i = indicates the estimated value of the phenomenon. X_i = the time factor, where i = (1, 2, 3,....., 17) in years. The value in brackets expresses the calculated (t) value, ** Significant at 0.01 level.
Source: Collected and calculated from the data of Table (3).

1- Efficient performance of export operations:

It is an indicator that reflects the extent of support, facilities, and policies provided to Egyptian exports, and as shown in Table (5), the performance efficiency of Egyptian export operations was greater than zero in all years of the study during the period (2005-2021), with an average value of about 11.07%. This is with a minimum of about 5.60% in 2020 and a maximum of about 16.73% in 2008, which means the efficiency of the performance of Egyptian export operations in general, and the trend of the level of that efficiency towards improvement during the aforementioned period except for the years 2020 and 2021 due to the Corona virus (covid19) and the subsequent slowdown in the performance of export operations.

2-The price competitive advantage of the Egyptian potato crop in the global market:

In recent years, it has been observed that the competitive advantage of Egyptian potatoes has declined in global markets, as it is clear from the data of Table. (6), which shows the competitive prices of the Egyptian potato crop and the countries competing for it in global markets during the period (2005-2021), that the export prices of Egyptian potatoes were The highest export prices, as it ranked last among eight countries, where the average export price per ton of potatoes was about $410/ton, which represents about 111% of the average world price of potatoes during the same period, which was about $368/ton.

Table (5) The Egyptian trade balance and national income during the period (2005-2021)

Year	total export value (billion pounds)	total import value (billion pounds)	Trade balance deficit	%exports /imports)	National income (million pounds)	export efficiency
2005	61.62	114.69	-53.07	53.73	506.51	12.17
2006	78.86	118.37	-39.51	66.62	581.14	13.57
2007	91.26	152.59	-61.33	59.81	710.39	12.85
2008	143.11	287.72	-144.61	49.74	855.30	16.73
2009	134.59	249.97	-115.38	53.84	994.06	13.54
2010	154.85	300.36	-145.51	51.55	1150.59	13.46
2011	188.35	371.45	-183.10	50.71	1309.91	14.38
2012	178.51	433.70	-255.19	41.16	1713.15	10.42
2013	197.71	456.00	-258.29	43.36	1924.81	10.27
2014	195.28	523.48	-328.20	37.30	2205.59	8.85
2015	163.25	568.91	-405.66	28.70	2473.10	6.60
2016	230.32	708.29	-477.97	32.52	2674.41	8.61
2017	461.27	1187.07	-725.80	38.86	3417.15	13.50
2018	522.08	1439.02	-916.94	36.28	4334.90	12.04
2019	494.74	1237.46	-742.72	39.98	5170.11	9.57
2020	309.74	687.32	-377.58	45.06	5526.95	5.60
2021	351.28	748.68	-397.40	46.92	5868.46	5.99
average	232.75	563.83	-331.07	45.66	2436.27	11.07

Source: Collected and calculated from the data of the Central Agency for Public Mobilization and Statistics, International Trade Data Center, 2022.

Table (6) Export prices and indices for the export of Egyptian potatoes and their competing countries in the global market during (2017-2021)

Country	2017		2018		2019		2020		2021		average	
	price	%	price	%	price	%	price	%	price	%	price	%
Germany	361	111	458	110	417	107	392	124	388	100	403	110
Holland	326	101	432	103	244	62	278	88	415	107	339	92
France	349	108	483	116	377	96	296	93	391	101	379	103
Belgium	257	79	395	95	476	122	361	114	369	95	372	101
Egypt	345	106	411	98	474	121	395	125	424	109	410	111
Canada	265	82	481	115	348	89	231	73	468	120	359	98
USA	258	80	382	91	374	96	248	78	316	81	316	86
China	371	115	397	95	395	101	439	138	327	84	386	105
World	324	100	418	100	391	100	317	100	389	100	368	100

The price is in dollars per ton.

Source: Compiled and calculated from data:

1- Food and Agriculture Organization (FAO), International Information Network www.faostat.org.
2- The World Trade website, the international information network, www.comtrade.org.
3- Administration of the Central Agency for Public Mobilization and Statistics, International Data Network www.capmas.gov.eg.

While the export prices of potatoes in the United States of America are considered the lowest export prices of potatoes in the global market, as the average price of exporting a ton of potatoes was about $316/ton, which represents about 86% of the average global price of potatoes during the same period, which was $368/ton, while the Netherlands, Canada, Belgium, France, China, and Germany occupy the second, third, fourth, fifth, sixth, and seventh positions in potato export prices in the global market, respectively, where the average price of exporting a ton of potatoes is about $339/ton, $359. / ton, 372 dollars/ton, 379 dollars/ton, 386 dollars/ton, 403.2 dollars/ton, which represents about 92%, 98%, 101%, 103%, 105% each, respectively, of the average international price of potatoes during average for the same period.

3- Market shares:

Increasing the volume of exports is a major goal for any country, and it is measured by the percentage of the country's exports in the global market or in any of the import markets, on the basis that the increase or decrease of this percentage over time is related to the extent of improvement or decline in competitiveness.

From reading the data of Table (7), it is clear that Germany ranks first in exporting potatoes to the world market, as the average amount of its potato exports during the period ((2005-2021) about 1940 thousand tons, which is equivalent to about 15% of the average world exports of potatoes during the same period, amounting to about 12678 thousand tons, followed by the Netherlands, France and Belgium, respectively, as the amount of their exports to the world market reached 1861, 1780, 1525 thousand tons, which represents about 15%, 14%, and 12%, respectively, of the average world exports of potatoes during the same period.

While Egypt ranks fifth, as the quantity of its potato exports during that period amounted to about 577 thousand tons, which is equivalent to about 5% of the average world exports of potatoes during the study period. Then Egypt is followed by Canada, the United States of America and China, as their average exports amounted to From potatoes to the world market, about 505, 473, 435 thousand tons, representing about 4%, 4%, and 3% of the average world exports of potatoes, respectively, during the same period.

Table (7) Market shares of Egypt and its most important competitor countries in exporting potatoes to the global market during the period (2017-2021).

Year	2017		2018		2019		2020		2021		average	
	Q.	%	Q.	%	Q.	%	Q.	%	Q.	%	Q.	%
Germany	1917	15	2105	15	1887	16	1859	14	1934	15	1940	15
Holland	1857	15	1923	14	1814	16	1846	14	1864	15	1861	15
France	1905	15	1988	15	1695	15	1592	12	1719	14	1780	14
Belgium	1425	11	1358	10	1582	14	1294	10	1966	16	1525	12
Egypt	788	6	503	4	562	5	561	4	472	4	577	5
Canada	512	4	454	3	416	4	574	4	569	5	505	4
USA	543	4	487	4	412	4	405	3	517	4	473	4
China	436	3	418	3	487	4	394	3	441	4	435	3
World	12776	100	13622	100	11584	100	12917	100	12493	100	12678	100

(Q.) = Quantity in thousand tons.

Source: Compiled and calculated from data:

1- Food and Agriculture Organization (FAO), International Information Network www.faostat.org.
2- The World Trade website, the international information network, www.comtrade.org.
3- Administration of the Central Agency for Public Mobilization and Statistics, International Data Network www.capmas.gov.eg.

4- Instability coefficient index:

By studying the relative stability of the volume of Egyptian exports of potatoes, the data of Table (8) shows that the quantity of Egyptian potato exports was characterized by relative instability, as the instability coefficient reached its lowest value of about 3.87% in 2013 and the highest value of 60.54% in that year. 2011, and the instability coefficient for the quantity of exports for the average study period was about 20.24, which is evidence of a weak relative stability in the quantity of Egyptian exports of potatoes.

By examining the relative stability coefficient for the value of Egypt's potato exports, the data of Table (8) shows that there is instability in the value of Egypt's potato exports during the study period (2005-2021), as its lowest value was about 0.4% in 2009, and its highest value 67.64% in 2014, and the average for the period was about 16.79%. This is evidence of the

weak relative stability in the value of Egypt's potato exports.

By studying the relative stability coefficient for the price of a ton of Egyptian potato exports, the data of Table (8) shows that the price of a ton of potato exports was characterized by relative instability, as it reached its lowest value at about 0.43% in 2021, while its maximum value reached about 46.37%. This was in 2008, while the average for the period was about 9.0%. This is also evidence of the relative instability in the price of a ton of Egyptian potato exports.

5- Gravity Model for Egyptian Exports:

The data of the basic model in Table (9) indicate that the changes included in the equation explain approximately 76% of the change in the quantity of Egyptian potato exports to the group of selected countries, which are (Kuwait, the Russian Federation, the Emirates, the United Kingdom, Germany, Lebanon, Greece) while the rest of the changes in the quantity of exports are due to other factors not measured by the model, and the significance of the model has been proven at a significant level of 0.01, where the results indicate that an increase in the gross domestic product of the group of countries together by 10% will lead to an increase in the amount of Egyptian exports of potatoes to these countries By 23.30%, and an increase in the value of the Egyptian gross domestic product by 10% will lead to an increase in the quantity of Egyptian exports of potatoes to the group of selected countries by 23.50%. Between Egypt and these countries by 10% will lead to a decrease in the amount of Egyptian exports to these countries by 35% with other factors constant. It also proved the significant positive effect of language on the amount of Egyptian exports of the potato crop during the study period (2005-2021).

The data of the modified model in the same table indicate that the total variables studied in the model explain about 78% of the changes in the quantity of Egyptian exports of potatoes, while the rest of the variables in the quantity of potato exports are due to other unmeasured variables, as the model's significance was proven at a significant level of 0.01. The results also indicate that an increase in the per capita share of the Egyptian GDP by 10% will lead to an increase in the amount of Egyptian exports of potatoes to these countries by 23.50%, and an increase in the per capita share of the Egyptian GDP by 10% will lead to an increase in the amount of exports. of potatoes to the selected countries by 21%, and the significant effect of the geographical distance was proven, as when the geographical distance between Egypt and any country increased by 10%, this would result in a decrease in the amount of exports between them by 35.30%, and the positive effect of language on the amount of exports was also proven significant of potatoes during the same period.

Table (8): The development of the instability coefficients for the quantity, value and export price of the potato crop at the level of the Republic during the period (2005-2021)

Year	Quantity coefficient (%)	Value coefficient (%)	Price coefficient (%)
2005	18.52	28.00	39.11
2006	33.59	44.35	16.41
2007	13.56	14.96	2.26
2008	19.03	19.70	46.37
2009	18.33	0.40	20.39
2010	19.59	15.55	3.41
2011	60.54	51.11	7.54
2012	37.55	27.46	13.87
2013	3.87	11.15	13.13
2014	45.94	67.64	12.21
2015	44.87	13.21	23.77
2016	30.18	31.34	4.22
2017	45.55	21.49	18.80
2018	11.04	11.46	3.29
2019	4.64	9.40	11.35
2020	8.47	12.30	7.09
2021	25.87	23.81	0.43
average	20.24	16.79	9.00

Source: Compiled and calculated from data:
Administration of the Central Agency for Public Mobilization and Statistics, International Trade Database, 2022.

Table (9) Results of gravity models for Egyptian exports of potatoes to the most important importing countries for the period (2017-2021).

Sample	The function	R\2	F
The prototype	Lny= 0.25 + 2.33Lnx1 + 2.35 Lnx2 – 3.50 Lnx3 + 6.64D (9.16)** (3.26)** (-10.32)** (9.14)**	0.76	27.74**
Modified model	Lny= 16.19+ 2.35 Ln $\bar{X}$1 + 2.10 Ln $\bar{X}$2 – 3.53 Lnx3 + 6.65D (9.71)** (3.54)** (-10.97)** (9.66)*	0.78	31.29**

Whereas:
** Significant at the level of 0.01.
y = Egyptian potato exports in thousand tons.
x1 = Gross Domestic Product of importing countries in billions of GDPj.
x2 = Egyptian Gross Domestic Product in billions of dollars GDPi.
x3 = The distance between Egypt and countries in km.
D = The dummy coefficient represents the language of the state, as the value of Arab countries is one and foreign countries its value is zero.
$\bar{x}$1 = per capita gross domestic product of the country in thousands of dollars, Pc GDPj.
$\bar{x}$2 = per capita share of Egyptian domestic product in thousands of dollars, Pc GDPi.
Source: Calculated from the data of Table (A).

Conclusion:

Export is an essential element for achieving economic growth, as it is an essential component of the country's foreign exchange earnings, which is necessary to finance economic development programs. Exports of agricultural commodities are also considered one of the most important items of Egyptian commodity exports. Potato is one of the most important export vegetable crops in Egypt. Of the importance of the export potato crop, but its exports are characterized by fluctuation and instability as well as low growth rate.

The study aimed to identify the competitiveness of Egyptian potatoes in foreign markets, by studying the productive situation of the potato crop in Egypt, studying the development of Egypt's exports and imports of the potato crop, and studying the Egyptian competitive position of potatoes in the global markets compared to some other potato exporting countries, and Studying the most important importing countries of the potato crop from Egypt, and the most important factors affecting the quantity exported.

The results showed that the performance efficiency of Egyptian export operations was greater than zero in all years of the study during the period (2005-2021), with an average value of about 11.07%, and that the export prices of Egyptian potatoes were the highest export prices, as it ranked last among Eight countries, where the average export price per ton of potatoes was about $410/ton, which represents about 111% of the average global price of potatoes during the same period, which was about $368/ton. Egypt ranks fifth in the world in terms of the amount of exports, as its exports reached during that period about 577 thousand tons, which is equivalent to about 5% of the average world potato exports, amounting to about 12678 thousand tons. It also showed weakness in the relative stability in the quantity, value and price of Egyptian exports of potatoes.

The results of the basic gravity model for the group of selected countries (Kuwait, the Russian Federation, the Emirates, the United Kingdom, Germany, Lebanon, and Greece) showed that an increase in the gross domestic product of the group of countries together by 10% will lead to an increase in the amount of Egyptian exports of potatoes to these countries. by 23.30%, and an increase in the value of the Egyptian gross domestic product by 10% will lead to an increase in the quantity of Egyptian exports of potatoes to the group of selected countries by 23.50%. A decrease in the quantity of Egyptian exports to these countries by 35%, and a significant positive effect of the language on the quantity of Egyptian exports of the potato crop during the study period (2005-2021), and the data of the modified gravity model indicate that the per capita increase in the Egyptian GDP by 10 % will lead to an increase in the quantity of Egyptian exports of potatoes to these countries by 23.50%, and an increase in the per capita share of the Egyptian domestic product by 10% will lead to an increase in the amount of exports of potatoes to the selected countries by 21%, as when the distance increases The geography between Egypt and any country by 10% will result in a decrease in the quantity of exports between them by 35.30%, and the positive effect of

language on the quantity of potato exports during the same period has been proven significant.

In light of the results, the study recommends the following:

1- Encouraging farmers to expand the cultivation of the potato crop, which leads to an increase in the quantity destined for foreign markets.

2- Establishing a database on the exporting markets and the most important competitors for exporting potatoes in these markets.

3- Work to support exporters to face intense competition, especially in the markets of Kuwait, the Russian Federation, the Emirates, the United Kingdom, Germany, Lebanon and Greece.

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Appendix

Table (A) Gravity model data for the group of selected countries for Egyptian exports of potato crop during the period (2017-2021).

Country	Statement	2017	2018	2019	2020	2021
Egypt	GDP	305.5	332.70	332.93	235.37	250.89
	PC GDP	3.38	3.60	3.53	2.44	2.55
Kuwait	Import(Q)	51.68	34.21	10.74	40.65	29.33
	GDP	342.63	214.57	209.55	419.55	441.68
	PC GDP	44.06	27.59	26.95	53.95	56.80
United Russia	Import(Q)	313.00	243.58	230.70	325.20	357.73
	GDP	3060.00	2360.00	2280.00	3580.00	4658.00
	PC GDP	393.50	303.48	293.19	460.36	598.99
The UAE	Import(Q)	41.00	46.02	24.44	65.27	51.90
	GDP	303.14	358.13	357.05	482.57	514.18
	PC GDP	38.98	46.05	45.91	62.06	66.12
United kingdom	Import(Q)	11.85	6.39	9.03	9.79	5.48
	GDP	3040.00	2900.00	2660.00	4640.00	3825.00
	PC GDP	390.92	372.92	342.06	596.67	491.87
Germany	Import(Q)	27.21	13.23	28.57	31.35	31.92
	GDP	1900.00	1380.00	1500.00	2690.00	2197.00
	PC GDP	244.33	177.46	192.89	345.92	282.52
Lebanon	Import(Q)	51.19	40.08	61.68	66.32	49.67
	GDP	28.13	29.94	31.21	43.14	44.96
	PC GDP	3.62	3.85	4.01	5.55	5.78
Greece	Import(Q)	21.64	50.89	38.76	85.96	65.68
	GDP	435.29	495.32	392.73	699.63	712.15
	PC GDP	55.98	63.69	50.50	89.97	91.58

GDP = gross domestic product (Billion dollar).

PC GDP = Per capita gross domestic product (one thousand dollars).

Import(Q) = The amount of potato imports from Egypt (thousand tons).

Source: Compiled and calculated from data:

1- Food and Agriculture Organization (FAO), International Information Network www.faostat.org.

2- The World Trade website, the international information network, www.comtrade.org.

3- Central Agency for Public Mobilization and Statistics, International Information Network www.capmas.gov.eg.

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