An economic study of onion production, consumption, and export in Egypt

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Abstract

Although Egyptian onion is considered one of the most important strategic vegetable crops, statistics indicate a clear fluctuation in production volume and foreign demand for Egyptian onions. This has led to instability in both export and local onion prices, as well as an increase in marketing margins for intermediaries of this crop, which necessitates studying the economic and marketing efficiency indicators of the onion crop. The study concluded that the marketing and pricing policies of onions have reflected on onion producers by returning the greater share of the price paid by consumers to these producers compared to what other intermediaries receive. The study also found that the average instability coefficient of both the export value and export price of onions was more stable than the average instability coefficient of the exported quantity during that period. The average instability coefficient of the exported quantity during that period was about 18.07, while the averages of the instability coefficients for the exported value and export price during the same period were about 12.12 and 12.09, respectively.

Keywords: Onion crop, instability index, agricultural exports, Egypt.

Introduction:

The Egyptian agricultural sector is considered one of the most important economic sectors that can play a highly significant role in facing international circumstances and changes. On one hand, it can work to increase the gains that may be brought about by such changes, and on the other hand, it reduces the negative effects that may result from these changes to the lowest possible level (Sediq, H.M., 2017). Moreover, Egyptian onion is regarded as one of the most important strategic vegetable crops, whether for local consumption or export. It ranks among the leading global varieties capable of withstanding transportation, handling, and storage for 5 - 8 months, which ensures a continuous supply for local consumers and export throughout the year, provided that the technical specifications of this crop are followed (Dawood, 2020). It is cultivated in three main seasons - winter, summer, and Nile - with the winter season being the principal one directed toward both consumption and export (El-Ghoneimy, S. & El-Azzazy, A.A., 2024). In addition to the early appearance of its crop, specifically during March and April of each year, with an average production of about 1,820.75 thousand tons during the study period, which precedes the appearance of European onions, Egyptian onions gain a wider opportunity for export to both Arab and European markets. Egypt is ranked among the top ten

countries worldwide in exporting winter onions, with total Egyptian onion exports in 2024 amounting to approximately 721 thousand tons, according to reports from the Ministry of Agriculture. Thus, onion exports occupy the second position after potatoes within the group of Egyptian vegetable exports. Despite this export significance, the quantity of onion exports remains relatively small, with average exports amounting to about 476.47 thousand tons, representing around 29.76% of the average total onion production during that period. Therefore, studying marketing margins is of great importance for understanding marketing problems, evaluating the efficiency of various operations within the marketing channel, and identifying the share of farmers, wholesalers, retailers, and intermediaries in general during the marketing stage (Owaida et al., 2021).

Despite the importance of onions as both a consumption and export crop, and Egypt's comparative advantage in its production, statistics indicate a clear fluctuation in production volume from year to year, as well as in foreign market demand for Egyptian onions. This has led to instability in both export and local onion prices, where the farm-gate price and wholesale price rose from 858 and 3,790 EGP/ton in 2015 to 3,063 and 6,400 EGP/ton in 2024. This situation affects both producers and consumers, while increasing the marketing margins for intermediaries of this crop, thereby necessitating a study of the economic and marketing efficiency indicators of onion locally and internationally.

Objectives:

The primary objective of this study is to describe and analyze the current situation of Egyptian onion production, consumption, and export during the period (2005 – 2024), in order to examine the economic and marketing efficiency of the onion crop. This is achieved through the study of several axes, including:

1. Examining the current status of production and consumption indicators of Egyptian onions, whether as a sole crop or intercropped across its three growing seasons.
2. Estimating marketing margins and the distribution of the consumer's pound between producers and intermediaries for the Egyptian onion crop.
3. Estimating the instability coefficient of onion export quantity, value, and prices, as well as analyzing the geographical distribution of Egyptian exports and identifying the main factors affecting the exported quantity during the period (2005 – 2024).

Research method and data sources:

The study relied in its analysis on the use of descriptive and quantitative statistical methods to describe and analyze the research variables. In addition, To analyze the determinants of Egyptian onion export volume, a multiple linear regression model was employed to examine the relationship between export quantity as the dependent variable (Y, measured in thousands of tons) and a set of explanatory variables that may influence it during the period (2005–2024), along with the use of the simple linear model to estimate the annual growth rates of the economic variables under study. The research primarily depended on secondary data, both published and unpublished, issued by relevant authorities such as the Central Agency for Public Mobilization and Statistics, the Ministry of Agriculture and Land Reclamation, and the Food and Agriculture Organization of the United Nations (FAO). It also utilized some data published

on international information networks such as [https://www.trademap.org/Index.aspx], in addition to the results of other studies and research related to the subject of the study.

Research Results and Discussion:

1. *Development of Total Fresh Onion Production in Thousands of Tons During the Period (2005-2024)*

This section addresses the study of the development of total fresh onion production in Egypt, measured in thousand tons, during the period (2005–2024).

- **Development of Total Winter Onion Production in Egypt:**

Data presented in Table (1) show that the production quantity of Egyptian onions (winter season) during the period (2005–2024) ranged between a minimum of 628.4 thousand tons in 2006 and a maximum of about 3,435.9 thousand tons in 2024. The first general trend equation presented in Table (2) indicates that the annual increase in the production quantity of Egyptian onions (winter season) amounted to about 143.29 thousand tons, representing approximately 7.86% of the annual average during that period, which was about 1,820.75 thousand tons. This increase was statistically significant at the 1% level. The coefficient of determination reached about 0.937, meaning that 93.7% of the variations in the production quantity of Egyptian onions (winter season) are attributed to time factors.

Data from Table (1) also indicate that the production quantity of Egyptian onions (summer season) during the same period ranged between a minimum of 32.2 thousand tons in 2021 and a maximum of about 298.1 thousand tons in 2014. Production continued to decline until it reached about 58.2 thousand tons at the end of the period in 2024. The second general trend equation presented in Table (2) shows that the annual decrease in the production quantity of Egyptian onions (summer season) amounted to about 12.99 thousand tons, representing approximately 7.4% of the annual average during that period, which was about 175.84 thousand tons. The coefficient of determination reached about 0.776, meaning that 77.6% of the variations in the production quantity of Egyptian onions (summer season) are attributed to time factors.

Data from the same Table (1) show that the production quantity of Egyptian onions (Nile season) during the study period ranged between a minimum of 70.3 thousand tons in 2005 and a maximum of about 203.2 thousand tons in 2015. Production continued to fluctuate between increases and decreases until it reached about 115.8 thousand tons at the end of the period in 2024. The third general trend equation presented in Table (2) indicated that the annual increase in the production quantity of Egyptian onions (Nile season) amounted to about 0.851 thousand tons, representing approximately 0.6% of the annual average during that period. However, this increase was not statistically significant.

Table (1): Total production of fresh onions in thousands of tons during the period from (2005 - 2024).

Years	Winter crop		summer crop		indigo crop		total production	
	Total	of total % production	Total	of total % production	Total	of total % production	Total	of the % average
2005	762.9	72.10	224.9	21.26	70.3	6.64	1058.1	48.56
2006	628.4	62.62	258.3	25.74	116.8	11.64	1003.5	46.05
2007	754.8	66.04	266.9	23.35	121.3	10.61	1143	52.46
2008	988.5	74.09	233.7	17.52	112	8.39	1334.2	61.23
2009	1302.1	80.17	245.2	15.10	76.8	4.73	1624.1	74.53
2010	752.5	65.53	284.1	24.74	111.7	9.73	1148.3	52.70
2011	1067.3	70.89	252.1	16.75	186.1	12.36	1505.5	69.09
2012	1389.3	79.84	228.1	13.11	122.6	7.05	1740	79.85
2013	1563.4	78.84	260.8	13.15	158.9	8.01	1983.1	91.01
2014	1731.8	78.54	298.1	13.52	175	7.94	2204.9	101.19
2015	1760.8	81.18	204.9	9.45	203.2	9.37	2168.9	99.54
2016	1815.9	88.67	116.7	5.70	115.4	5.63	2048	93.99
2017	1751.3	86.77	121.2	6.00	145.9	7.23	2018.4	92.63
2018	2292.7	90.46	110	4.34	131.8	5.20	2534.5	116.32
2019	2781.2	92.62	109.2	3.64	112.5	3.75	3002.9	137.81
2020	2723.9	92.06	102.9	3.48	132.1	4.46	2958.9	135.79
2021	2859.0	94.78	32.2	1.07	125.2	4.15	3016.4	138.43
2022	2693.7	94.27	42.5	1.49	121.3	4.24	2857.5	131.14
2023	3359.6	94.68	66.7	1.88	121.9	3.44	3548.2	162.84
2024	3435.9	95.18	58.2	1.61	115.8	3.21	3609.9	165.67
Average	1820.75	81.97	175.84	11.15	128.83	6.89	2125.42	97.54

Source: Central Agency for Public Mobilization and Statistics, Economic Affairs Sector, Agricultural Price Bulletin, various issues.

Table (2): General trend equations for the development of the quantity of production of the Egyptian onion crop in the three seasons (winter, summer and Nile) during the period (2005-2024):

index	equation	F	R^2
Winter production	Y = 286846.781 + 143.289 x (16.758) **	(280.84) **	**0.937**
Summer production	Y = 26358.291 – 12.997 x ** (-8.123)	** (65.98)	**0.776**
Nile production	Y = 1585.116 + 0.851 x (0.741)	(0.55)	**0.028**

Source: Calculated from the data in Table No. (1).

2. *Development of Onion Consumption in Egypt (in thousand tons) and Development of Average Per Capita Consumption (kg/year) during the period (2005 –2024):*

The data presented in Table (3) indicate that the quantity of consumption of Egyptian onions during the period (2005 – 2024) ranged between a minimum of 918 thousand tons in 2008 and a maximum of about 2,972 thousand tons in 2024. The first general trend equation presented in Table (4) shows that the annual increase in the quantity of onion consumption amounted to about 93.932 thousand tons, representing approximately 3.16% of the annual average during that period, which was about 2,972 thousand tons. This increase was statistically significant at the 1% level, while the coefficient of determination reached about 0.810, meaning that 81% of the variations in the quantity of onion consumption in Egypt are attributed to time factors.

The data from the same Table (3) indicate that the average per capita consumption of Egyptian onions during the same period ranged between a minimum of 10.7 kg/year in 2011 and a maximum of about 24.7 kg/year in 2023. Consumption continued to fluctuate between increases and decreases until it reached about 22.1 kg/year at the end of the period in 2024. The second general trend equation presented in Table (4) shows that the annual increase in the average per capita consumption of Egyptian onions amounted to about 0.458 kg/year, representing approximately 2.81% of the annual average during that period, which was about 16.29 kg/year. The coefficient of determination reached about 0.581, meaning that 58.1% of the variations in the average per capita consumption of Egyptian onions are attributed to time factors

Table (3): Development of consumption and average per capita share of onion crop during the period from (2005 - 2024).

Years	Available for consumption	Population (millions)	Average per capita consumption (kg/year)	% Consumption of total production
2005	973	69.9	14.1	91.96
2006	980	71.3	12.5	97.66
2007	1033	72.9	14.1	90.38
2008	918	74.4	11.2	68.81
2009	1015	76.1	13.6	62.50
2010	1485	77.8	19.5	129.32
2011	939	79.6	10.7	62.37
2012	1231	81.6	15.4	70.75
2013	1389	83.6	17	70.04
2014	1318	85.8	15.8	59.78
2015	1369	87.9	16.9	63.12
2016	1480	90.1	16.2	72.27
2017	1455	92.1	12.9	72.09
2018	1191	96.3	15.7	46.99
2019	1848	98.1	18.3	61.54
2020	1933	99.8	19.6	65.33
2021	2288	101.5	18.3	75.85
2022	2328	102.9	17.1	81.47
2023	2522	104.5	24.7	71.08
2024	2972	105.9	22.1	82.33
Average	1533.35	87.61	16.29	74.78

Source: Central Agency for Public Mobilization and Statistics, Economic Affairs Sector, various issues

Table (4): Equations for the general trend in consumption quantity and average per capita share of onion production during the period (2005-2024).

No.	index	equation	F	R2
1	consumption	Y = 187677.113 + 93.932 x ** (9.012)	** (81.208)	0.810
2	Average per capita	Y = 906.375 + 0.458 x ** (5.129)	** (26.30)	0.581

calculated and compiled the data from table number (3)

3. Development of Onion Prices in Egypt (EGP/ton) during the period (2005–2024)

In this section, we examine the development of onion prices in Egypt, which include farm-gate price, wholesale price, and retail price, measured in EGP/ton during the period (2005 – 2024)

- **The development of both farm-gate, wholesale, and retail prices of onions in Egypt:**

Data presented in Table (5) show that the farm-gate price of Egyptian onions during the period (2005 – 2024) ranged between a minimum of 228.4 EGP/ton in 2005 and a maximum of about 3,063 EGP/ton in 2024. The first general trend equation presented in Table (6) indicates that the annual increase in the farm-gate price amounted to about 133.678 EGP/ton, representing approximately 12.73% of the annual average during that period, which was about 1,050.36 EGP/ton. This increase was statistically significant at the 1% level, while the coefficient of determination reached about 0.812, meaning that 81.2% of the variations in the farm-gate price of Egyptian onions are attributed to time factors. The data presented in Table (5) indicate that wholesale prices of Egyptian onions during the same period ranged between a minimum of 488 EGP/ton in 2005 and a maximum of about 6,760 EGP/ton in 2022. The annual increase in wholesale prices amounted to about 328.396 EGP/ton, as shown in Table (6), representing approximately 11.16% of the annual average during that period, which was about 2,941.45 EGP/ton. The coefficient of determination reached about 0.849, meaning that 84.9% of the variations in wholesale prices of Egyptian onions are attributed to time factors. The data presented in Table (5) also show that retail prices of Egyptian onions during the study period ranged between a minimum of 658 EGP/ton in 2005 and a maximum of about 7,660 EGP/ton in 2022. This fluctuation between increases and decreases continued until the end of the period in 2024, when retail prices reached about 7,630 EGP/ton. The third general trend equation presented in Table (6) indicated that the annual increase in retail prices of Egyptian onions amounted to about 371.078 EGP/ton, representing approximately 10.12% of the annual average during that period, which was about 3,665.55 EGP/ton. The coefficient of determination reached about 0.871, meaning that 87.1% of the variations in retail prices of Egyptian onions are attributed to time factors.

4. Development of Absolute Marketing Margins and Distribution of the Consumer Pound for Onions in Egypt during the period (2005 – 2024)

In this section, we examine the development of both the absolute marketing margins for wholesale and retail traders, the total absolute margins, as well as the distribution of the consumer pound for onions in Egypt during the period (2005 – 2024).

- **The development of absolute marketing margins for both wholesale and retail traders, as well as the total margins of onions in Egypt during the period (2005–2024):**

Data presented in Table (5) illustrate the development of absolute marketing margins and the shares of farmers, wholesale traders, and retail traders in the consumer pound for onions during the period (2005 – 2024). It was found that the marketing margin between the wholesale trader and the producer of onions ranged between a minimum of 259.60 EGP/ton in 2005 and a maximum of about 4,721 EGP/ton in 2022. The first general trend equation presented in Table (7) indicates that the annual increase in the marketing margin between the wholesale trader and the producer amounted to about 194.72 EGP/ton, representing approximately 10.7% of the annual average during that period, which was about 1,819.10 EGP/ton. This increase was statistically significant at the 1% level, while the coefficient of determination reached about 0.675, meaning that 67.5% of the variations in the marketing margin between the wholesale trader and the producer of Egyptian onions are attributed to time factors. The data presented in Table (5) indicate that the marketing margin between the retail trader and the wholesale trader of onions ranged between a minimum of 136 EGP/ton in 2008 and a maximum of about 1,230 EGP/ton in 2024.

Table (5): Development of producer, wholesale, and retail prices, marketing margins, and distribution of consumer pounds for onion crops during the period (2005-2024). Pounds/ton

years	Distribution of the consumer pound			Marketing differences or margins						Average Prices			The share of the intermediaries
				Retail - Farms		Wholesale - Retail		Wholesale - Farms					
	Retailer's share	Wholesaler's share	Farmer's share	relative	absolute	relative	absolute	relative	absolute	Retail Price	Wholesale Price	Farm Price	
2005	25.84	39.45	34.71	65.29	429.60	25.84	170.00	53.20	259.60	658.00	488.00	228.40	65.29
2006	32.90	35.06	32.04	67.96	576.30	32.90	279.00	52.25	297.30	848.00	569.00	271.70	67.96
2007	26.55	48.41	25.04	74.96	943.00	26.55	334.00	65.91	609.00	1258.00	924.00	315.00	74.96
2008	17.62	44.04	38.34	61.66	476.00	17.62	136.00	53.46	340.00	772.00	636.00	296.00	61.66
2009	38.84	31.65	29.50	70.50	1147.00	38.84	632.00	51.76	515.00	1627.00	995.00	480.00	70.50
2010	20.46	48.23	31.31	68.69	1323.00	20.46	394.00	60.64	929.00	1926.00	1532.00	603.00	68.69
2011	31.62	26.46	41.92	58.08	913.00	31.62	497.00	38.70	416.00	1572.00	1075.00	659.00	58.08
2012	28.75	27.06	44.19	55.81	893.00	28.75	460.00	37.98	433.00	1600.00	1140.00	707.00	55.81
2013	27.10	44.08	28.82	71.18	1865.00	27.10	710.00	60.47	1155.00	2620.00	1910.00	755.00	71.18
2014	27.29	52.94	19.76	80.24	3410.00	27.29	1160.00	72.82	2250.00	4250.00	3090.00	840.00	80.24
2015	20.38	61.60	18.03	81.97	3902.00	20.38	970.00	77.36	2932.00	4760.00	3790.00	858.00	81.97
2016	27.04	52.54	20.42	79.58	3414.00	27.04	1160.00	72.01	2254.00	4290.00	3130.00	876.00	79.58
2017	24.54	57.89	17.56	82.44	4501.00	24.54	1340.00	76.72	3161.00	5460.00	4120.00	959.00	82.44
2018	35.29	23.88	40.82	59.18	1509.00	35.29	900.00	36.91	609.00	2550.00	1650.00	1041.00	59.18
2019	22.79	51.42	25.78	74.22	3028.00	22.79	930.00	66.60	2098.00	4080.00	3150.00	1052.00	74.22
2020	13.45	57.67	28.88	71.12	4758.00	13.45	900.00	66.63	3858.00	6690.00	5790.00	1932.00	71.12
2021	7.92	59.11	32.97	67.03	4062.00	7.92	480.00	64.19	3582.00	6060.00	5580.00	1998.00	67.03
2022	11.75	61.63	26.62	73.38	5621.00	11.75	900.00	69.84	4721.00	7660.00	6760.00	2039.00	73.38
2023	12.86	58.09	29.06	70.94	4966.00	12.86	900.00	66.66	4066.00	7000.00	6100.00	2034.00	70.94
2024	16.12	43.74	40.14	59.86	4567.00	16.12	1230.00	52.14	3337.00	7630.00	6400.00	3063.00	59.86
Average	23.46	46.25	30.30	69.70	2615.20	23.46	724.10	59.81	1891.10	3665.55	2941.45	1050.36	69.70

Source: Central Agency for Public Mobilization and Statistics, Economic Affairs Sector, Agricultural Price Bulletin, various issues

Table (6): Equations of the general trend of the farm price and both wholesale and retail prices of the onion crop during the period (2005-2024).

No.	index	equation	F	R^2
1	Product price	Y = 268191.461 + 133.678 x **(9.045)	** (81.804)	0.812
2	wholesale price	Y = 658641.045 + 328.396 x **(10.338)	** (106.87)	0.849
3	retail price	Y = 743906.727 + 371.078 x **(11.326)	** (128.28)	0.871

Source: Calculated from the data in Table No. (5).

The second general trend equation presented in Table (7) shows that the annual increase in the marketing margin between the retail trader and the wholesale trader amounted to about 42.682 EGP/ton, representing approximately 5.9% of the annual average during that period, which was about 724.10 EGP/ton. This increase was statistically significant at the 1% level, while the coefficient of determination reached about 0.534, meaning that 53.4% of the variations in the marketing margin between the retail trader and the wholesale trader of Egyptian onions are attributed to time factors. Meanwhile, the marketing margin between the retail trader and the producer of onions ranged between a minimum of 429.60 EGP/ton in 2005 and a maximum of about 5,621 EGP/ton in 2022. The third general trend equation presented in Table (7) shows that the annual increase in the marketing margin between the retail trader and the producer amounted to about 237.400 EGP/ton, representing approximately 9.1% of the annual average during that period, which was about 2,615.20 EGP/ton. This increase was statistically significant at the 1% level, while the coefficient of determination reached about 0.724, meaning that 72.4% of the variations in the marketing margin between the retail trader and the producer of Egyptian onions are attributed to time factors.

Table (7): General trend equations, absolute marketing margins for wholesalers and retailers, total absolute margins, and the distribution of the consumer pound from the onion crop during the period (2005-2024).

No.	index	equation	F	R^2
1	Marketing margin (wholesale – producer)	Y = 390449.593 + 194.719 x **(6.284)	(39.49) **	0.675
2	Marketing margin (retail – wholesale)	Y = 85265.673 + 42.682 x **(4.666)	(21.77) **	0.534
3	Marketing margin (retail – producer)	Y = 475715.266 + 237.400 x **(7.068)	(49.95) **	0.724
4	Producer's share	Y = 249.884 + 0.140 x (0.415)	(0.173)	0.009
5	Wholesaler's share	Y = 1379.194 + 0.707 x (1.676)	(2.81)	0.129
6	Retailer's Share	Y = 1728.92 – 0.847 x *(-3.55)	* (12.60)	0.399

Source: Calculated from the data in Table No. (5).

- **Development of the Distribution of the Consumer Pound for Onions in Egypt during the period (2005 – 2024):**

In this part, the study addresses the development of the distribution of the consumer pound during the period (2005–2024), which means the allocation of the value of one pound paid by the consumer among the producer and the different marketing agents involved in marketing the

commodity. The absolute price difference divided by the retail price represents this distribution, thereby allowing us to determine the share of the producer, the wholesale trader, and the retail trader from the final price paid by the consumer. The data presented in Table (5) indicate that the producer's share fluctuated from year to year during the study period, ranging between a minimum of 17.56% in 2017 and a maximum of about 40.14% in 2024, with an annual average of about 30.30%. The fourth general trend equation presented in Table (7) shows that the annual increase in the producer's share amounted to about 0.140%, but this increase was not statistically significant. The data presented in Table (5) show that the share of the wholesale trader from onions ranged between a minimum of 23.88% in 2018 and a maximum of about 61.60% in 2015, indicating clear fluctuations between increases and decreases during that period. The annual average share of the wholesale trader during that period was about 46.25%. The fifth general trend equation presented in Table (7) shows that the annual increase in the share of the wholesale trader amounted to about 0.707%, but this increase was not statistically significant either. The data show that the share of the retail trader from onions ranged between a minimum of 7.92% in 2021 and a maximum of about 38.84% in 2009. The sixth general trend equation presented in Table (7) indicates that the annual increase in the share of the retail trader amounted to about 0.847%, representing approximately 3.6% of the annual average during that period, which was about 23.46%. This increase was statistically significant at the 5% level, while the coefficient of determination reached about 0.399, meaning that 39.9% of the variations in the share of the retail trader of Egyptian onions are attributed to time factors.

It is noteworthy that the estimates of the producer's share of the onion price constituted a significant proportion compared to the share of marketing intermediaries, which reflects a clear advantage for producers even though at declining rates during the study period. From this, it becomes evident that the marketing and pricing policies of onions have been reflected on onion producers by returning the larger share of the price paid by the consumer to these producers, compared to what the other intermediaries receive. This, in turn, contributes to improving the efficiency of the onion marketing system in Egypt.

5. Development of Marketing Efficiency and Price Mark-Up for Onions in Egypt during the period (2005–2024)

In this section, we examine the development of both marketing efficiency and price mark-up for onions in Egypt during the period (2005–2024). According to the study by **(El-Kashef, M.F., 2024)**, marketing efficiency is expressed as the ratio between the output of marketing activity — represented in satisfying consumer needs—and the total production elements used in the marketing process. An increase in marketing efficiency leads to a reduction in marketing costs, an increase in the producer's price, and a decrease in the consumer's price.

If marketing efficiency equals 50%, this indicates that marketing margins are equal to production costs. Marketing efficiency is considered low if the output is less than 50%. **(Al-Ghoneimi, S. and Al-Azzazi, A.A. 2024)** clarified that marketing efficiency can be calculated using the following equation:

- Marketing Efficiency = **100 – (Absolute Difference / [Absolute Difference + Production Cost per Ton] * 100)**
- Absolute Difference = **(Retail Price – Producer Price)**

Meanwhile, price mark-up, sometimes referred to as the rate of price increase, can be calculated using the following equation:

• Price Mark-Up = **(Absolute Difference / Wholesale Price) * 100**

Data in Table (8) indicated that marketing efficiency ranged between a minimum of 13.49% in 2015 and a maximum of about 21.68% in 2024, with an annual average of about 20.97%. The first general trend equation in Table (9) showed that the annual rate of decline in marketing efficiency was about 0.183%, but this decline was not statistically significant. Referring to the estimated results in Table (8), it is evident that marketing efficiency remained below 50% throughout the study period, which indicates that marketing margins exceeded production costs during that time. This reflects the profits obtained by intermediaries during the marketing stages. Meanwhile, data in Table (8) show that the price mark-up ranged between a minimum of 71.36% in 2024 and a maximum of about 110.36% in 2014. The second general trend equation presented in Table (9) indicates that the annual decrease in the price mark-up amounted to about 1.12%, representing approximately 1.22% of the annual average during that period, which was about 91.94%. This decrease was statistically significant at the 5% level, while the coefficient of determination reached about 0.206, meaning that 20.6% of the variations in the price mark-up of Egyptian onions are attributed to time factors.

Table (8): Development of marketing efficiency and price increase for onion crop during the period (2005-2024). Egyptian Pound/ton

years	absolute difference	cost per ton	wholesale price	marketing efficiency	price mark-up
2005	429.60	204.98	488.00	32.30	88.03
2006	576.30	220.16	569.00	27.64	101.28
2007	943.00	222.38	924.00	19.08	102.06
2008	476.00	248.93	636.00	34.34	74.84
2009	1147.00	255.07	995.00	18.19	115.28
2010	1323.00	251.62	1532.00	15.98	86.36
2011	913.00	272.12	1075.00	22.96	84.93
2012	893.00	300.55	1140.00	25.18	78.33
2013	1865.00	480.05	1910.00	20.47	97.64
2014	3410.00	609.55	3090.00	15.16	110.36
2015	3902.00	608.58	3790.00	13.49	102.96
2016	3414.00	698.51	3130.00	16.99	109.07
2017	4501.00	736.79	4120.00	14.07	109.25
2018	1509.00	743.40	1650.00	33.00	91.45
2019	3028.00	831.47	3150.00	21.54	96.13
2020	4758.00	858.88	5790.00	15.29	82.18
2021	4062.00	900.29	5580.00	18.14	72.80
2022	5621.00	929.07	6760.00	14.18	83.15
2023	4966.00	1225.64	6100.00	19.80	81.41
2024	4567.00	1264.46	6400.00	21.68	71.36
Average	2615.20	593.13	2941.45	20.97	91.94

Source: Central Agency for Public Mobilization and Statistics, Economic Affairs Sector, Agricultural Price Bulletin, various issues

Table (9): Equations of the general trend of marketing efficiency and price increase for the onion crop during the period.(2024−2005)

No.	index	equation	F	R^2
1	Marketing efficiency	Y = 390.551 − 0.183 x (−0.697)	(0.486)	0.025
2	price mark-up	Y = 2343.394 − 1.118 x *(−2.219)	* (4.922)	0.206

Source: Calculated from the data in Table No. (7).

6. *Development of the Quantity, Value, and Price of Egyptian Onion Exports during the period (2005 – 2024):*

This section addresses the developments in both the quantity, value, and price of Egyptian onion exports during the period (2005–2024). Data presented in Table (10) indicate that the quantity of Egyptian onion exports during the period (2005–2024) ranged between a minimum of 266.90 thousand tons in 2007 and a maximum of about 669 thousand tons in 2022. The quantities then fluctuated between increases and decreases until they reached about 621 thousand tons at the end of the period in 2024. The average quantity of onion exports amounted to about 476.47 thousand tons. The general trend equation No. (1) presented in Table (11) shows that the annual increase in the exported quantity of onions amounted to about 15.372 thousand tons, representing approximately 3.23% of the annual average during that period.

Table (10): Development of the quantity, value, and price of Egyptian onion exports during the period (2005-2024).

years	Area (thousand feddans)	Total production (thousand tons)	Export volume (thousand tons)	Value of exports (in millions of EGP)	Export price (EGP per ton)	Export volume as a percentage of total production
2005	113.19	1058.1	247.70	101.19	291	23.86
2006	134.92	1003.5	271.70	124.88	336	37.04
2007	157.00	1143	266.90	132.47	361	32.10
2008	110.86	1334.2	306.00	209.09	515	30.43
2009	139.78	1624.1	407.00	322.96	637	31.22
2010	148.40	1148.3	538.00	379.61	595	55.56
2011	168.38	1505.5	566.00	445.55	669	44.24
2012	166.75	1740	466.00	570.53	1008	32.53
2013	179.75	1983.1	499.00	1286.05	2147	30.21
2014	160.38	2204.9	506.00	2413.70	3983	27.48
2015	145.51	2168.9	611.00	1786.03	2512	32.78
2016	184.10	2048	441.00	1415.26	2616	26.42
2017	210.57	2018.4	586.00	1854.26	2703	33.99
2018	174.30	2534.5	445.00	2037.76	3739	21.50
2019	197.63	3002.9	597.00	2269.43	3256	23.21
2020	207.68	2958.9	503.00	3916.49	6495	20.38
2021	208.09	3016.4	512.00	2842.74	4645	20.29
2022	230.60	2857.5	669.00	4158.75	5408	26.91
2023	244.30	3548.2	470.00	4970.97	8721	16.06
2024	249.60	3609.9	621.00	11766.72	16320	19.97
Average	176.59	2125.42	476.47	2150.22	3347.85	29.76

Source: Central Agency for Public Mobilization and Statistics, Economic Affairs Sector, Foreign Trade Bulletin, various issues

The coefficient of determination reached about 0.538, meaning that 53.8% of the variations in the quantity of onion exports are attributed to time factors. Meanwhile, data from the same Table (10) indicate that the value of onion exports during the same period ranged between a minimum of 101.19 million EGP in 2005 and a maximum of about 11,766.72 million EGP in 2024. It is evident from the second general trend equation presented in Table (11) that the statistically significant annual increase in the value of exported onions amounted to about 461.432 million EGP, representing approximately 21.45% of the annual average during that period, which was about 2,150.22 million EGP. The coefficient of determination reached about 0.601, meaning that 60.1% of the variations in the value of onion exports are attributed to time factors.

Furthermore, data from the same Table (10) show that the export price of onions during the study period ranged between a minimum of 291 EGP/ton in 2005 and a maximum of about 16,320 EGP/ton in 2024. The third general trend equation in Table (11) indicates that the statistically significant annual increase in the export price of onions amounted to about 645.339 EGP/ton, representing approximately 19.27% of the annual average during that period, which was about 3,347.85 EGP/ton. The coefficient of determination reached about 0.651, meaning that 65.1% of the variations in the export price of Egyptian onions are attributed to time factors.

Table (11): Equations of the general trend for the development of the quantity, value, and price of Egyptian onion exports during the period (2024−2005)

No.	index	equation	F	R^2
1	Export quantity	Y = 30489.732 + 15.372 x **(4.576)	** (20.94)	0.538
2	Export value	Y = 927068.157 + 461.432 x **(5.353)	** (28.66)	0.601
3	Export price	Y = 1296298.149 + 645.339 x **(5,955)	** (35.46)	0.651

Source: Calculated from the data in Table No. (9).

7. Geographical Distribution of the Major Markets for Egyptian Onion Exports Worldwide during the period (2020–2024):

By studying the geographical distribution of Egypt's onion exports, it becomes clear that the Saudi market accounted for about 23.17% of exports, as shown in Table (12), which presents the major importing countries of Egyptian onions.

Table (12): Geographical distribution of the most important Egyptian export markets for onions worldwide during the period (2020-2024).

Countries	Average value of Egyptian exports (thousands of dollars)	Relative importance of Egyptian exports	Average price per ton
Saudi Arabia	35386.4	23.17	653.98
Britain	32002.4	20.95	656.22
Netherlands	25902.2	16.96	685.15
Russia	18853.8	12.35	832.50
Germany	10724.8	7.02	671.18
Italy	8392.2	5.50	783.34
UAE	7466.2	4.89	670.00
Poland	5613.6	3.68	1761.95
Kuwait	4912.8	3.22	661.75
Total	152722.6	2.27	

Source: Central Agency for Public Mobilization and Statistics, Foreign Trade Database, various issues. United Nations Trade Map: https://www.trademap.org/Index.aspx

The United Kingdom ranked second with a relative importance of about 20.95%, while the Netherlands ranked third with about 16.96% of total onion exports during that period. Meanwhile, the highest average value per ton during the same period was recorded for Poland, which imported onions at a value of about 1,761 USD per ton, followed by Russia at 832.5 USD per ton, whereas the lowest export price was for Saudi Arabia at about 653.98 USD per ton during the period (2020–2024).

8. Instability Coefficient of Onion Exports during the period (2005–2024).

The instability coefficient of exports is used to measure the annual fluctuations in the quantity, value, or price of export commodities, as indicated by El-Khoshn (2020) in his study. There are several methods for measuring the degree of instability, the most common of which is the method of average percentage deviations. Its steps are as follows:

1. Estimating the general trend equations for the quantity, value, or price of the commodity's exports during the study period.
2. Calculating the estimated values of that quantity, value, or price for the years of the study.
3. Calculating the annual percentage deviations of the estimated values from the actual values using the following equation:**(Actual Value – Estimated Value / Estimated Value * 100)**
4. Instability Coefficient = Geometric Mean of the percentage deviations of the estimated values from the actual values. **(Mustafa et al. 2020)** clarified that, according to the instability coefficient measure, the optimal case for export stability occurs when this coefficient equals zero. By calculating the instability coefficient for the quantities, prices, and values of onion exports during the period (2005–2024), as shown in Table (13), it is evident that the exported quantity of Egyptian onions was more stable during the years (2005, 2006, 2009, 2018, 2019, and 2023), where the instability coefficient in those years was respectively (6.2, 1.4, 5.9, 4.4, 5.2, 4.7). The average instability coefficient for the exported quantity during that period was about 18.07.

The same table also shows that the value of Egyptian onion exports was more stable during the years (2006, 2009, 2010, 2014, 2017, 2018, 2019, and 2022), where the instability coefficient in those years was respectively (6.3, 9.3, 2.1, 9.8, 9.7, 5.5, 8.2, 8.3). The average instability coefficient for the export value during that period was about 12.12.

Meanwhile, the export price of Egyptian onions was more stable in most of the study years, specifically in (2006, 2007, 2008, 2009, 2015, 2017, 2018, 2019, 2020, 2021, and 2023), where the instability coefficient in those years was respectively (7.3, 9.2, 4.1, 3.3, 2.9, 7.3, 5, 2.2, 9.8, 9.5, 7.4). The average instability coefficient for the export price during that period was about 12.09.

From the above, it is clear that the average instability coefficient for both the value and price of onion exports was more stable than the average instability coefficient for the exported quantity during that period.

9. The Most Important Factors Affecting the Quantity of Egyptian Onion Exports during the period (2005–2024):

By using the linear regression model to determine the relationship between (Y), which represents the quantity of onion exports in thousand tons as the dependent variable, and the influencing factors represented by (X1) the quantity of domestic production in thousand tons, (X2) the export price in EGP/ton, and (X3) the cultivated area in thousand feddans, the relationship was expressed by the following equation

Y = 86.423 + 0.59 X1 - 0.01 X2 + 1.67 X3

(0.91) * (-0.78) * (1.40) *

R2 = 0.470 F = (4.73) *

The value of the coefficient of determination in the model, which was statistically significant at the 5% level, indicates that about 47% of the variations in the quantity of onion exports are explained by the explanatory variables in the equation, while about 53% of the variations in export quantity are due to other factors not subject to measurement. It is also evident that there is a statistically significant positive relationship between the quantity of exports and both domestic production and cultivated area, as well as a statistically significant negative relationship between the quantity of exports and the export price. The model itself was statistically significant at the 5% level.

Table (13): Instability Coefficients for Egyptian Onion Exports during the Period (2005-2024).

Instability coefficient for export price	instability coefficient for export value	instability coefficient for export quantity	years
25.2	27.6	6.2	2005
7.3	6.3	1.4	2006
9.2	13.7	10.3	2007
4.1	11.2	13.5	2008
3.3	9.3	5.9	2009
10	2.1	15.4	2010
22.5	26.9	33.2	2011
16.3	17.5	42.5	2012
23.4	12.8	38.2	2013
21.2	9.8	19.4	2014
2.9	11.6	16.9	2015
29.3	10.7	33.1	2016
7.3	9.7	23.3	2017
5	5.5	4.4	2018
2.2	8.2	5.2	2019
9.8	15.4	35.1	2020
9.5	12.1	23.6	2021
11.6	8.3	13.3	2022
7.4	11.2	4.7	2023
14.3	12.5	15.9	2024
12.09	12.12	18.07	Average

Source: Central Agency for Public Mobilization and Statistics, Foreign Trade Database, various issues. Compiled and calculated from the Food and Agriculture Organization (FAO) website, FAOSTAT. United Nations Trade Map: https://www.trademap.org/Index.aspx.

Recommendations:

1. Implement pricing policies that achieve a real return for producers, leading to increased production.
2. Activate the role of agricultural extension to reduce crop losses.
3. Pay attention to the quality standards required for onion exports, as it is one of the important export crops to world markets.

4. Focus on improving the production efficiency of onions through the development of new high-yielding varieties.
5. The necessity of reducing the number of intermediaries in the marketing process of the onion crop, as this contributes to improving marketing efficiency.
6. The provision of production inputs to producers at lower costs, which supports the expansion of the cultivated area.

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دراسة اقتصادية لإنتاج واستهلاك وتصدير البصل في مصر

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الملخّص

بالرغم من أن محصول البصل المصري يعد من أهم محاصيل الخضر الاستراتيجية إلا إن الإحصائيات تشير إلى تذبذب واضح في كمية الإنتاج والطلب الخارجي على البصل المصري مما أدى إلى تذبذب أسعار التصدير والأسعار المحلية للبصل وزيادة الهوامش التسويقية للوسطاء من هذا المحصول مما يتطلب تحليل مؤشرات الكفاءة الاقتصادية والتسويقية لمحصول البصل وقد توصلت الدراسة إلى أن السياسات التسويقية والتسعيرية للبصل قد انعكست على منتجي البصل من خلال إرجاع النصيب الأوفر من السعر الذي يدفعه المستهلك الى هؤلاء المنتجين مقابل ما يحصل علية باقي الوسطاء وقد توصلت الدراسة ايضاً الى أن متوسط معامل عدم الاستقرار لكل من قيمة وسعر تصدير البصل كانا أكثر استقرار من متوسط معامل عدم الاستقرار للكمية المصدره منه خلال تلك الفترة حيث بلغ متوسط معامل الاستقرار للكمية المصدرة خلال تلك الفترة نحو 18.07 بينما بلغ متوسط كل من معامل الاستقرار للقيمة المصدرة وسعر التصدير خلال تلك الفترة نحو 12.12 , 12.09 على التوالي.

الكلمات المفتاحية: محصول البصل، معامل عدم الاستقرار، الصادرات الزراعية، مصر.