

Content is available at: CRDEEP Journals
Journal homepage: <http://www.crdeepjournal.org/category/journals/ijssah/>

International Journal of Social Sciences Arts and Humanities

(ISSN: 2321-4147) (Scientific Journal Impact Factor: 6.002)
A Peer Reviewed Quarterly Journal



Full Length Research Paper

Value Chain Analysis of Artichoke Production in Egypt

Eman Abd Elaziz Rabea*, Rehab Gamal Eldin Elhaga and Nerveen Samir Yassa Gerges

Economics Research Institute, Agricultural Research Center, Egypt

ARTICLE DETAILS

Corresponding Author:
Eman Abd Elaziz Rabea

Key words:

Value chain, Value Added, Artichoke, Processing station.

ABSTRACT

Artichokes are considered one of the non-traditional export vegetable crops. The problem of the study was that Egypt produces approximately one-fifth of the world's artichoke production, but the volume of its exports is not proportional to this production, and large quantities of artichoke exports are made in the fresh form, not the processed form, thus reducing the added value of the exports Artichoke. The study mainly aims to enhance the competitiveness of Egyptian artichokes by tracking the various productions and processing stages and identifies the strengths and weaknesses of all actors in the artichoke value chain by studying the following: the chronological development and current status of artichoke production in Egyptian agriculture and the Bahira Governorate, They are indicators of the external market for Egyptian artichokes, Value chain analysis of artichokes in Kafri Elda war Center general characteristics of the value chain, and identifying the strengths and weaknesses of the value chain links for artichokes in Kafri Elda war Center. The results of the study showed that Egypt ranks first in the world as the most important producing and exporting country, as the average quantity of Egyptian artichoke exports reached about 26.92 thousand tons during the study period. While the value of artichoke exports took a general increasing trend during the study period with an annual growth rate of about 10.5% of the period average of about 421.6 million pounds. It was also found that the most important actors in the value chain are suppliers of production inputs, farmers, importers, Processing stations (Nawala), food factories and exporters. The added value per acre of artichoke was about 125,150 pounds, and the farmer's profit for one inflorescence amounted to about 2.0 pounds, while the importers achieved an added value estimated at about 0.50 pounds, rising to about 0.65 pounds per inflorescence (Noura) in the event of lending to farmers. In light of the findings of the study, it recommends establishing an artichoke marketing unit in the study area that includes actors in the value chain and strengthens the horizontal and vertical links between them. Its mission will be to provide market information, especially with regard to external prices, export opportunities, and specifications required for export to bring together the parties of the chain, and to strengthen the negotiating position in particular. For farmers and owners of processing stations in the face of the monopolistic situation of factories and exporters, concluding contracts between the parties and following up on their fulfillment.

1. Introduction

Artichoke is a non-traditional export vegetable crop ,Artichoke derives its importance from its nutritional and medicinal value, which is due to the fact that its Noura contain large amounts of vitamins A and B before they open. It is also rich in iron, phosphorus, and calcium salts, in addition to the bile-producing substance cynarine, which is useful in cases of liver disease

* Author can be contacted at: Economics Research Institute, Agricultural Research Center, Egypt

Received: Received: 12-July-2024; Sent for Review on: 24- July -2024; Draft sent to Author for corrections: 27- July -2024; Accepted on: 05-August -2024; Online Available from 06-August- 2024

DOI: [10.13140/RG.2.2.24513.16482](https://doi.org/10.13140/RG.2.2.24513.16482)

IJSSAH: 2024-83/© 2024 CRDEEP Journals. All Rights Reserved.

(Aoun, 1997). The Kafr Eldawar center in Beheira Governorate is considered one of the area's most famous for its production, which is classified globally as the most suitable environment for growing artichokes, as its cultivation excels in the moderate climate in the regions of southern Europe and the Mediterranean basin.

The area cultivated with artichoke crops in Beheira Governorate is about 15.41 thousand feddan, representing about 41.8% of the artichoke area in Egyptian agriculture, which amounts to about 36.86 thousand feddan in 2022 (Ministry of Agriculture and Land Reclamation, 2022). The amount of Egyptian exports of fresh and frozen artichokes amounted to about 39.28 thousand tons, with a value of about 747.8 million pounds in 2022 (Ministry of Agriculture and Land Reclamation, 2022). Artichokes are grown in Egypt mainly for export, and the most important varieties that are widely cultivated in Egypt are local and French artichokes. Local artichokes are grown on a large scale, representing 90% of the artichoke area cultivated in Egypt (Tamer, 2016).

There is no doubt that studying the marketing system, methods of marketing production, and the type of individuals dealing in the artichoke marketing process are considered among the matters that influence the marketing decisions taken by all parties and circles of the marketing process, starting from farmers all the way to manufacturers and exporters. They are also considered among the vital matters through which specific changes can be made. In this composition or system to achieve the desired and targeted adjustments in the marketing performance of this important crop, and from here highlights the importance of raising marketing efficiency and overcoming the marketing problems of artichokes, which is reflected in achieving remunerative prices for the product that lead to increasing agricultural production and also in achieving appropriate prices for the parties to the marketing process.

Food and Agriculture Organization data indicate that the five most important countries in artichoke production are, respectively, Egypt, Italy, Spain, Algeria, and Peru, with an average production for the period (2020-2022) of about 424.4, 373.8, 302.9, 123.9, and 92.9 thousand tons for each of them, respectively. A percentage representing about 27.2%, 23.9%, 13.1%, 7.9%, and 5.9% for each of them, respectively, of the average global production for the same period, which amounts to about 1.56 million tons, meaning that Egypt comes in first place in the world in artichoke production, and its production volume exceeds a quarter of production. Globally, Egypt comes in third place as the most important country exporting fresh artichokes during the same period, with an amount of exports estimated at about 4.0 thousand tons, representing about 10.9% of the world's total exports of fresh artichokes, after France and Italy, at a time when both France and Italy are among the most important countries. Producing, exporting and importing countries (Food and Agriculture Organization).

1.1 The study Problem:

Egypt produces approximately a quarter of the world's artichoke production, but the volume of its exports is not commensurate with this production at a time when there are great export opportunities for Europe due to the early appearance of Egyptian production in the market. Also, large quantities of artichoke exports are made in the fresh form and not the processed form, thus reducing the added value of artichoke exports. The artichoke market is characterized by fluctuation and price instability as a result of its connection to foreign marketing, which affects the incomes of farmers and workers in artichoke processing plants. This requires studying the process of artichoke production and marketing to identify the most important problems facing artichoke producers and marketers and trying to overcome them, to enhance its competitiveness in the foreign market.

1.2 Objectives of the study:

The study mainly aims to enhance the competitiveness of Egyptian artichokes by tracking the various productions and processing stages and identifies the strengths and weaknesses of all actors in the artichoke value chain by studying the following:

- 1- The chronological development and current status of artichoke production in Egyptian agriculture and the Beheira Governorate.
 - 2- They are indicators of the external market for Egyptian artichokes.
 - 3- Value chain analysis of artichokes in Kafr Eldawar Center.
 - 4- General characteristics of the value chain, and identifying the strengths and weaknesses of the value chain links for artichokes in Kafr Eldawar Center.
2. **Analytical method and data sources:** To achieve its objectives, the study relied on the use of both descriptive and quantitative analytical methods, using arithmetic averages and percentages, and using simple linear regression to estimate the general trend equations, as well as estimating some economic indicators such as profitability indicators, marketing margins and added value used in analyzing the value chain of the artichoke crop. At Kafr Eldawar Center.

The study relied on both secondary data published by the Ministry of Agriculture and Land Reclamation, the Central Agency for Public Mobilization and Statistics, the Food and Agriculture Organization, the Directorate of Agriculture in Beheira Governorate, and the Kafr Eldawar Agricultural Administration, where artichoke cultivation is concentrated, and primary data through a simple random sample of actors in the value chain of the crop. Artichokes in the Kafr Eldawar Center are represented by farmers, importers, processing station, and food factories for the agricultural season 2023/2024, with 50 forms for farmers collected from three villages in the center, namely Sidi Ghazi, Kom El-Baraka, and Bardala, where the area of artichokes in those villages reached about 985,745,625. An feddan for each of them, respectively, with a total area of about 2,355 feddan, representing about 47% of the center's artichoke area, which amounts to about 5,000 feddan for the season (2023/2024) (Ministry of Agriculture and Land Reclamation, Beheira Agriculture Directorate, Statistics Department), 20 forms for the bringers, 30 forms for the processing station, representing about 5% of the number of processing station in the center, which amounts to about 600 Nawala, in addition to 5 forms for food factories.

3. Theoretical framework:

1. *Value Chain:* Porter defines the value chain as "a set of interconnected activities that are necessary to create goods and services from raw materials to the final consumer" (Porter, M., 1985). The value chain is used in the agricultural field to shed light on adding value through the process of transforming inputs and products as they pass through the chain. The concept of the value chain includes an integrated set of activities and participants in the transfer of agricultural products, from input suppliers to farmers' fields to the consumer's table. Each participant in the chain has a link linking him to the next, so that it forms an integrated and successful chain. At each stage, a process of transformation or addition to the product takes place, ranging from simply transporting the product from point A to point B to complex manufacturing and packaging operations. Accordingly, the value chain is often defined as a succession of a number of value-adding activities extending from production to consumption, through manufacturing and commercial exploitation (Miller, C. and Linda Jones, 2013). The value chain is also defined as the group of activities involved in manufacturing and transporting the product from the farm to the consumer's table (Miller. and da Silva, C. 20109). As for value chain analysis, it is the evaluation of workers and factors that affect performance in an activity, and the relationships between participants, which aims to identify the constraints that hinder improving performance, productivity, and competitiveness in that activity and how to adapt those constraints (Fries, B. 2007).

2. *Value Added:* Economic value added is defined as the difference between the value of production and the value of production inputs and is estimated through the following equation:

$$\text{Value added} = \text{value of production} - \text{value of production inputs}$$

As for the marketing added value, it is measured by the difference between the prices received by the primary producer and the prices paid by the final consumer, or by the price margin that covers the marketing operations of the product in its final form between the various marketing parties.

4. Results and discussion

First: The chronological development and current situation of artichoke production in Egyptian agriculture and the Beheira Governorate during the period (2008-2022):

(1) *Development of the area, productivity and production of the artichoke crop in Egyptian agriculture:* By reviewing the data contained in Table No. (1) And the results of the statistical analysis presented in Table No. (2), it was found that the area cultivated with the artichoke crop ranged between a minimum of approximately 18.24 thousand feddan in 2008, and a maximum of approximately 40.84 thousand feddan in 2017, and by estimating the general trend equation. The cultivated area was shown to have taken a general increasing and statistically significant trend with an annual increase of about 1.16 thousand feddan, and an annual growth rate estimated at about 3.9% of the period average of about 29.74 thousand feddan. It was also shown that the feddan productivity of the artichoke crop ranged between a minimum of about 7.88 tons/feddan in 2018, and a maximum of about 12.25 tons/feddan in 2021, and the statistical significance of the estimated general trend equation for feddan productivity in its various forms was not proven, which indicates stability. Its relative value fluctuates around the period average of about 9.48 tons/feddan. It became clear that the production of the artichoke crop ranged between a minimum of about 168.6 thousand tons in 2016, and a maximum of about 479.24 thousand tons in 2021. By estimating the general trend equation for the cultivated area, it was found that it took a general increasing and statistically significant trend with an annual increase amounting to about 12.98 thousand tons. With an annual growth rate estimated at about 4.6% of the average period of about 282.14 thousand tons.

(2) *Development of the area, productivity, and production of the artichoke crop in Beheira Governorate:* By reviewing the data in Table No. (1), it was found that the area cultivated with artichoke crops in Beheira Governorate ranged during the study period between a minimum of about 6.38 thousand feddan in 2016 and a maximum of about 20.46 thousand feddan in 2017. The statistical significance of the trend equation was not proven. The estimated area of cultivated artichokes in their various forms, which indicates their relative stability and fluctuation around the average period of about 13.39 thousand feddan.

Table 1: Development of the area, productivity, and production of artichokes in Egyptian agriculture during the period (2008-2022)

Year	Egyptian agriculture			Beheira Governorate		
	Area thousand feddan	Productivity tons/feddan	Production thousand tons	Area thousand feddan	Productivity tons/feddan	Production thousand tons
2008	18.24	9.67	176.37	9.67	9.1	88.04
2009	20	10.48	209.61	11.86	9.88	117.23
2010	20.93	10.16	212.68	12.45	9.67	120.33
2011	21.45	8.91	191.12	13.71	9.12	125.06
2012	39.23	9.02	353.87	16.23	8.82	143.16
2013	34.71	8.51	295.56	11.34	9.23	104.61
2014	35.02	9.23	266.24	14.23	9.51	135.19
2015	25.36	8.64	219.18	7.5	9.4	70.49
2016	20.94	8.05	168.61	6.38	5.99	38.25
2017	40.84	8.26	337.41	20.46	8.33	170.36
2018	34.34	7.88	270.68	13.96	8.06	112.42
2019	35.08	8.62	302.56	14.25	8.69	123.85
2020	24	10.75	257.95	16.16	8.85	142.95
2021	39.11	12.25	479.24	17.18	8.91	152.95
2022	36.86	11.74	432.64	15.41	8.96	138.07
Average	29.74	9.48	282.14	13.39	8.83	118.86

Source: Compiled and calculated from: Ministry of Agriculture and Land Reclamation, Economic Affairs Sector, Agricultural Statistics Bulletin, various issues.

It was also found that the feddan productivity of the artichoke crop in Beheira Governorate ranged between a minimum of about 5.99 tons/feddan in 2016, and a maximum of about 9.88 tons/feddan in 2009. The statistical significance of the estimated general trend equation for the feddan productivity of the artichoke crop in Beheira Governorate was not proven in Its different forms, which indicates its relative stability and fluctuation around the period average of about 8.83 tons/feddan.

Table 2: Estimating the general trend equations for the area and production of the artichoke crop in Egyptian agriculture during the period (2008-2022)

Items		Equation	F	R ²	growth rate %
Egyptian agriculture	Area	$\text{Ln } Y = 3.04 + 0.039 T$ (2.72)*	7.38*	0.36	3.9
	Production	$\text{Ln } Y = 5.23 + 0.046 T$ (3.04)**	9.2**	0.42	4.6

** Significant at 1% probability level

*Significant at 5% probability level

Source: Collected and calculated from analysis of the data presented in Table (1).

It became clear that the production of the artichoke crop in the Beheira Governorate ranged between a minimum of about 38.25 thousand tons in 2016, and a maximum of about 170.36 thousand tons in 2017. The statistical significance of the estimated general trend equation for the production of the artichoke crop in the Beheira Governorate in its various forms was not proven, which indicates... Its relative stability and fluctuation around the period average of about 118.86 thousand tons.

Second: The most important indicators of the external market for Egyptian artichokes:

(1) *Global production of artichokes and the most important producing, exporting and importing countries:* It is clear from the data in Table No. (3) that the average global production of artichoke during the period (2020-2022) amounted to about 1.6

million tons, and that the five most important countries in artichoke production are, respectively, Egypt, Italy, Spain, Algeria and Peru, with an average annual production of About 424.4, 373.8, 203.9, 124, and 92.9 thousand tons for each of them, respectively, at a rate of about 27.2%, 23.9%, 13.1%, 7.9%, and 5.9% of the average global production for each of them, in the same order. That is, Egypt comes in first place and produces approximately one-third of global production. The average global exports during the same period amounted to about 150.2 thousand tons, and the most important exporting countries are, respectively, Spain, Egypt, Italy, France, and Tunisia, with the number of exports amounting to about 40.6, 30.3, 23.7, 12.22, and 9.4 thousand tons for each of them, respectively, at a rate of 26.9%, 20.2%, 15.8%, 8.1%, 6.3% of the average global exports for each of them, in the same order. The data presented in Table No. (4) indicate that the most important countries importing fresh Egyptian artichokes during the period (2020-2022) are Italy, Turkey, and Lebanon, with quantities amounting to about 4353.7, 307.3, and 62.3 tons for each of them, respectively, with a percentage estimated at about 87.7%, 6.2%, 1.3% each and in the same order of the average total fresh Egyptian artichoke exports, which amount to about 4966.7 tons.

Table 3: Average global production and the most important artichoke producing and exporting countries for the period (2020-2022)

		Item				
The most important producing countries	Global production	Quantity	1561.6	Global exports	Quantity	150.2
	Egypt	Quantity	424.4	Spain	Quantity	40.6
		Ratio (%)	27.2		Ratio (%)	26.9
		Quantity	373.8		Quantity	30.3
	Italy	Ratio (%)	23.9	Egypt	Ratio (%)	20.2
		Quantity	203.9		Quantity	23.7
	Spain	Ratio (%)	13.1	Italy	Ratio (%)	15.8
		Quantity	124		Quantity	12.22
	Algeria	Ratio (%)	7.9	France	Ratio (%)	8.1
		Quantity	92.9		Quantity	9.4
	Peru	Ratio (%)	5.9	Tunisia	Ratio (%)	6.3

The quantity of artichoke exports includes fresh, frozen cooked and frozen Uncooked Thousand tons.

Source: Compiled and calculated from:

- 1- The Internet, database www.fostat.org.
- 2- The Internet, database www.trademap.org

As for the most important countries importing frozen uncooked Egyptian artichokes, they are America, Italy, and Spain, with quantities amounting to about 7229.4, 6785.6, and 4453.2 tons each, respectively, with a percentage estimated at about 29.3%, 27.5%, and 18.1% for each of them, in the same order, of the average total Egyptian artichoke exports. The amount of frozen, uncooked artichokes amounted to about 24,659.7 tons. It was also found that the most important countries importing frozen cooked Egyptian artichokes are Italy, Spain, and Palestine, with quantities amounting to about 249, 155.4, and 97.2 tons for each of them, respectively, with a percentage estimated at about 27.4%, 17.1%, and 10.7% for each of them. In the same order as the average total exports of frozen cooked Egyptian artichokes, amounting to about 30,000.5 tons. From the above it is clear that Italy and Spain are classified as the most important producing, exporting and importing countries, which indicates the import and re-export of Egyptian artichokes by these countries, especially Italy, which accounts for 38% of the total exports of Egyptian artichokes in their various forms.

Table 4: The most important countries importing fresh and frozen Egyptian artichokes as an average for the period (2020-2022)

Country	Fresh		Frozen uncooked		Frozen cooked		Total	
	amount	rate	amount	rate	amount	rate	amount	rate
	Tons	%	Tons	%	Tons	%	Tons	%
Italy	4353.7	87.7	6785.6	27.5	249	27.4	11388	38
America	0	0	7229.4	29.3	95.7	10.5	7325	24.4
Spain	35.8	0.7	4453.2	18.1	155.4	17.1	4644	15.5
France	61.8	1.2	1401.9	5.7	40.3	4.4	1504	5
Belgium	0	0	1169.8	4.7	17.8	2	1188	4
Greece	18.1	0.4	1033.3	4.2	71	7.8	1122	3.7
Turkey	307.3	6.2	575.8	2.3	82.3	9	965	3.2
Israel	8.1	0.2	343.3	1.4	50.7	5.6	402	1.3

Palestine	0	0	61.9	0.3	97.2	10.7	159	0.5
Lebanon	62.3	1.3	27	0.1	0	0	89	0.3
the total	4847.1	97.6	23081.3	93.6	859.4	94	28787.8	96
Rest of the world	119.6	2.4	1578.4	6.4	50.9	5.6	1212.7	4
Total	4966.7	100	24659.7	100	910.3	100	30000.5	100

Source: Compiled and calculated from:

1- The Internet, database www.fostat.org. 2- The Internet, database www.trademap.org.

(2) Development of the quantity and value of Egyptian artichoke exports during the period (2008-2022): By reviewing the data contained in Table No. (5), and the results of the statistical analysis presented in Table (6), it was found that the total amount of artichoke exports ranged between a minimum of approximately 15.41 thousand tons in 2014, and a maximum of approximately 44.57 thousand tons in 2022, and by estimating the equation The general trend for the total amount of artichoke exports in its various mathematical forms shows that it is not significant, which indicates its fluctuation around the period average of about 26.92 thousand tons, although the value of the coefficient of non-variation indicates its instability during the study period, as it reached 30.1%.

It was also found that the total value of artichoke exports ranged between a minimum of about 148.8 million pounds in 2008, and a maximum of about 824.84 million pounds in 2022. By estimating the general trend equation for the total value of artichoke exports, it was found that it took a general increasing and statistically significant trend with an increasing amount. Annually, it amounted to about 44.26 million pounds, with an annual growth rate estimated at about 10.5% from the average period of about 421.55 million Pounds.

By studying the quantity of exports for both fresh and frozen artichokes, it was found that they ranged between a minimum of about 1.08 and 12.29 thousand tons for each, respectively, in 2016 and 2008 in the same order, and a maximum of about 12.5 and 40.91 thousand tons for each in 2013, 2016 in the same order. By estimating the trend equation for the total quantity of exports for each of them, it is revealed that the estimated function for each is not significant, which indicates its fluctuation around the average period, although the value of the coefficient of non-difference indicates that neither of them was stable during the study period, even though the instability was greater for the quantity of fresh artichoke exports, as It reached 62.1% and 43.2% for each of them, respectively.

It turned out that the value of exports for both fresh and frozen artichokes ranged between a minimum of about 20.1 and 95.25 million pounds for each, respectively, in 2014 and 2008, and a maximum of about 185.01, 732.7 million pounds for each, respectively, in 2019 and 2022, by estimating the trend equation. The estimated function for the value of fresh artichoke exports showed no significance in the year for the total value of exports for each of them, while the value of frozen artichoke exports took a general increasing trend with an annual increase amounting to about 37.26 million pounds, with an annual growth rate estimated at about 10.9% from the average period of about 341.87 million pounds.

By studying the degree of stability of the value of fresh and frozen artichoke exports, it was found that they were characterized by a high degree of instability and instability during the study period, although the instability was greater in the value of fresh artichoke exports, as the value of the coefficient of variation reached about 64.6% and 57.3% for each of them, respectively.

Table 5: Development of the quantity and value of Egyptian artichoke exports During the period (2008-2022)

Year	Total artichoke exports		Fresh artichokes				Frozen artichokes			
	amount	value	amount	%	value	%	amount	%	value	%
2008	23.29	148.8	11	47.2	53.55	36	12.29	52.8	95.25	64
2009	22.15	316.09	2.2	9.9	144.4	45.7	19.95	90.1	171.7	54.3
2010	29.75	302.39	11.1	37.3	86.06	28.5	18.65	62.7	216.3	71.5
2011	24.79	245.92	6	24.2	63.17	25.7	18.79	75.8	182.8	74.3
2012	18.59	224.37	6.3	33.9	56.13	25	12.29	66.1	168.2	75
2013	26.84	203.01	12.5	46.6	35.95	17.7	14.34	53.4	167.1	82.3
2014	15.41	185.24	2.3	14.9	20.1	10.9	13.11	85.1	165.1	89.1
2015	31.06	259.48	1.93	6.2	20.08	7.7	29.13	93.8	239.4	92.3
2016	41.99	396.61	1.08	2.6	33.56	8.5	40.91	97.4	363.1	91.5

2017	31.16	811.21	8.51	27.3	168.47	20.8	22.65	72.7	642.7	79.2
2018	18.44	502.88	2.96	16.1	57.62	11.5	15.48	83.9	445.3	88.5
2019	28.65	717.67	10.12	35.3	185.01	25.8	18.53	64.7	532.7	74.2
2020	23.92	589.65	4.98	20.8	74.17	12.6	18.94	79.2	515.5	87.4
2021	23.12	595.04	5.16	22.3	104.82	17.6	17.96	77.7	490.2	82.4
2022	44.57	824.84	4.76	10.7	92.06	11.2	39.81	89.3	732.8	88.8
Average	26.92	421.55	6.06	18.7	79.68	18	20.9	75.0	342	78.9
C.V.	30.1	55.5	62.1		64.6		43.2		57.3	

Amount with thousand-ton, Value with million pounds.

Source: Compiled and calculated from: Ministry of Agriculture and Land Reclamation, Economic Affairs Sector, Bulletin of Foreign Trade Statistics for Agricultural Exports and Imports, various issues.

Table 6: Estimating the general time trend equations for the quantity and value of Egyptian exports during the period (2008-2022)

Items		Equation	F	R ²	growth rate %
Total artichoke	Quantity	Ln Y = 3.09 + 0.020 T (1.06) ^{n.s}	1.35 ^{n.s}	0.09	-
	value	Ln Y = 5.06 + 0.105 T (5.3) ^{**}	27.9 ^{**}	0.68	10.5
Fresh artichokes	Quantity	Ln Y = 1.76 + 0.023 T (0.5) ^{n.s}	0.25 ^{n.s}	0.01	-
	value	Ln Y = 3.9 + 0.033 T (0.78) ^{n.s}	0.60 ^{n.s}	0.04	-
Frozen artichokes	Quantity	Ln Y = 2.67 + 0.037 T (1.7) ^{n.s}	3.10 ^{n.s}	0.19	-
	value	Ln Y = 4.75 + 0.109 T (6.14) ^{**}	37.6 ^{**}	0.73	10.9

Significant at the 1% probability level.^{n.a} Not significant.

Source: Collected and calculated from analysis of the data presented in Table No. (5)

Third: Analysis of the artichoke value chain for the study sample at Kafr Eldawar Center: Figure No. (1) indicates a diagram of the artichoke value chain and identifies the actors in it, starting from suppliers of production inputs to the final consumer, and by examining the most important links in this chain by analyzing costs and revenues and estimating the added value of each, and identifying strengths and weaknesses to identify the obstacles and problems affecting each of them. Show the following:

(1) Farmers: Artichokes are grown during the months of July and August, and the delay in planting leads to not catching the appropriate time for export (December, January) before production appears in European countries. The harvest begins in early cultivations in November with a small number of Noura and then increases gradually until the months of April and May.

By analyzing the items of production costs per feddan of artichoke in the farms of the study sample, presented in Table No. (7), it was found that the total production costs amounted to about 76,350 pounds. The fixed costs, represented by land rent, constitute about 52.39% of the total costs, with a value of about 40,000 pounds, and the variable production costs constitute about 47.61% of it, with a value of about 36,350 pounds. The variable costs are divided into the costs of conducting agricultural operations and the costs of production inputs, at a value of about 15,000 and 21,350 pounds for each, respectively, with a rate of about 19.65% and 27.96% for each of them in the same order.

The most important items of agricultural operations costs were harvesting, pest control, and hoeing operations, at a value of about 7,650, 1,600, and 1,500 pounds for each of them. respectively, by a rate of about 10.02%, 2.10%, and 1.96% for each of them in the same order of total production costs, while the most important items of production input costs were the costs of Breeding mind and foliar fertilizer costs, with a value of about 9600 and 3000 pounds for each of them, respectively, with a percentage They amounted to about 12.57% and 3.93% each in the same order of the total production costs.

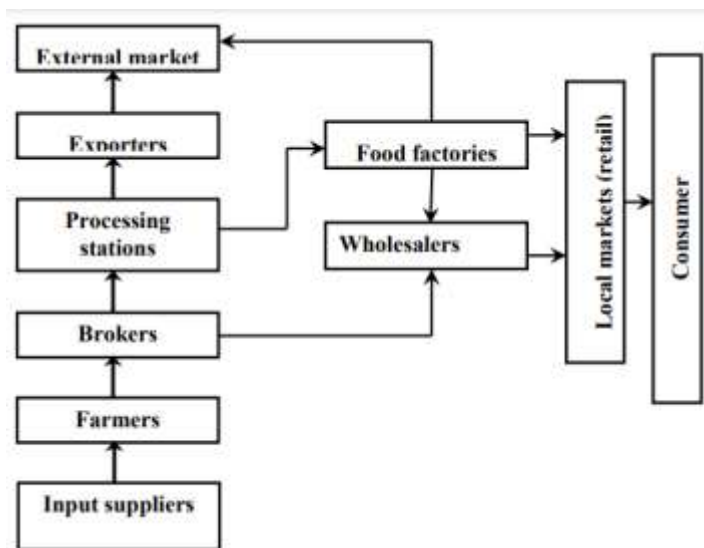


Fig 1. The value chain of fresh and prepared artichokes for the study sample at the Kafr Eldawar Center

Table 7: Productive cost items and their relative importance per feddan of artichoke in the study sample

Items	the value (pound)	Relative importance (%)
First: Variable costs		
(a) Costs of agricultural operations	15000	19.25
Plowing	400	0.52
Creeping	350	0.46
Planning	200	0.26
Erase fonts	300	0.39
Agriculture	1200	1.57
Irrigation	1200	1.57
Spreading manure	600	0.79
He hoed	1500	1.96
Pest control	1600	2.1
Harvest	7650	10.02
(b) Production input costs	21350	27.96
Breeding mind	9600	12.57
Manure	2750	3.6
Nitrogen fertilizer	2500	3.27
Phosphate fertilizer	500	0.65
Potassium fertilizer	1000	1.31
Foliar fertilizer	3000	3.93
Pesticides	2000	2.62
Total variable costs	36350	47.61
Second: Fixed costs		
Feddan rent	40000	52.39
Total costs	76350	100

Source: Collected and calculated from questionnaire data for the study sample.

Table 8: Feddan productivity and profitability indicators for artichoke feddan in the study sample.

Item	Unit	unit price (pounds)	Quantity	value
Main output	Noura	3.5	35000	122500
By-product*	carat	1200	20	24000
Total revenue	pound			146500
Net return	pound			70150

Value Added	pound	125150
Relative profitability	%	192.98
Ratio of revenue to costs	%	191.88
Return on invested pounds	Piasters.	91.88
The farmer's profit per Noura	Pound/Noura	2

The by-product is the value of the artichoke plants after the end of the crop harvest season for use as breeding mind the following year.

- Value added = value of production - value of production inputs
- Relative profitability = (net revenue / total variable costs) x 100
- Revenue to Cost Ratio = Total Revenue / Total Costs
- Return on invested pounds = net return per feddan / total costs
- Farmer's profit per inflorescence = net yield / feddan productivity

Source: Collected and calculated from questionnaire data for the study sample

With regard to feddan revenues, it became clear that the harvest season begins 4-5 months after planting and continues for about 5 months, at a rate of once a week, as the main inflorescence is harvested first at the beginning of the season and then the side Noura after that. It is clear from the data in Table No. (8) That the average production of a feddan of artichoke in the study sample was about 35 thousand Noura the average price of one inflorescence for the season amounted to about 3.5 pounds/inflorescence, with a value of about 122,500 pounds/feddan. It was also found that the by-product of the artichoke crop, represented by artichoke plants sold for use as seeds in the following season (artichokes reproduce vegetative by dividing mothers), amounts to about 20 Carat/feddan, with an average price of about 1,200 pounds/carat, with a value of about 24,000 pounds/feddan, representing about 16.38% of the total revenue per feddan, amounting to about 146.5 thousand pounds/feddan.

The profitability indicators presented in Table No. (8) Indicate that the net per-feddan return on the farms of the study sample amounted to about 70.15 thousand pounds, and that the added value per feddan amounted to about 125.15 thousand pounds, while the relative profitability amounted to about 192.98%. The ratio of revenues to costs is about 191.88%, achieving a high return on the invested pound, amounting to about 91.88 piasters. The farmer's profit margin for each inflorescence produced was estimated at about 2.0 pounds per inflorescence. From the above, it is clear that the artichoke crop generates a profitable return for the farmer when compared to alternative crops that can be grown, taking into account the duration of the crop's stay in the field, which may extend to approximately ten months.

(2) *Brokers:* The importers represent the link between the farms and the processing station (artichoke processing stations), as they buy artichoke Noura each pick (almost every week) from the farms and supply them to the processing station. The study showed that Al-Broker does not pay the full purchase price to the farmer, but rather pays a cash amount on account until the price is determined and the account is settled, which may be delayed until the end of the season. In some cases, Al-Broker lends money to the farmer before planting to spend on growing artichokes in exchange for a guarantee to purchase the crop at a preferential price. While the average purchase price from farmers was about 3.5 pounds/Noura, it decreased to about 3.35 pounds/Noura if a loan was provided to the farmer from Al-Broker.

The broker bears marketing costs estimated at approximately 150 pounds per 1,000 Noura, including 60 pounds of loading costs and 90 pounds of transportation costs. The average selling price of the loom was about 4.0 pounds/ Noura, so the marketing margin amounted to about 0.50 pounds/ Noura, and the net profit of the broker was about 0.35 pounds/Noura, noting that the marketing margin and the net profit of the broker increase in the event of providing a loan to the farmer to 0.65 and 0.50 pounds/Noura for each, respectively. It was also found that a small percentage of the importers, about 10% of the study sample, marketed to the wholesale market, with an average price of about 4.2 pounds/Noura, with a marketing margin of 0.65 pounds/Noura, and a net profit of about 0.44 pounds/Noura, each of which increases in the event of providing a loan to the farmer for about 0.80, 0.59 pounds/Noura respectively, Table No. (9).

Table 9: Marketing costs, added value, and net profit of Broker for Noura Artichoke in the study sample.

Marketing entity	Purchasing price		Marketing costs in pounds		selling price		Marketing margin pound	Net profit pound
	In case	pound	loading	transport	Wholesale	pound		
Nawala	Farm lending	3.35	0.06	0.1	0.2	4	0.65	0.5

Wholesale market	Not lending to farms	3.5					0.5	0.35
	Farm lending	3.35					0.8	0.59
	Not lending to farms	3.5	0.06	0.2	0.2	4.2	0.65	0.44

Source: Collected and calculated from questionnaire data for the study sample.

(3) Processing Station (Nawala): Processing station for preparing artichokes rely on the use of simple tools consisting of a set of plastic boxes and barrels, knives for peeling and cutting, wooden tables, water basins, in addition to chemicals used in preservation such as citric acid, ascorbic acid, and table salt. The artichoke processing process requires both male and female workers, as there is a clear division of labor and a different role for each of them in the processing process. The average number of workers in the loom reached about 36 workers/day, and the average ratio of females to males reached about 3:1, as they are among the activities are labor-intensive for females, and taking into account the number of processing station in the study area, which is about 600, they provide about 21,600 job opportunities during the artichoke season, in addition to the fact that 20% of the processing station work in preparing other vegetables and some fruits after the end of the artichoke season. The daily wage of the workers is estimated at production. For females, it was about 100 pounds for peeling 1,000 Noura, and the average female productivity reached 2,500 Noura/day, with an average daily wage of about 250 pounds/day, while for males, the wage was calculated on the basis of 110 pounds for preparing (cutting, pitting) one barrel of artichokes, and the average worker’s productivity was 3 barrels/day, with an average daily wage of about 330 pounds/day.

Work on processing station in the first two months (December and January) of the beginning of the artichoke season is limited to preparing fresh artichokes for export by shortening the inflorescence holder to a length of 10 to 15 cm. The Noura are packed in plastic boxes and transported in refrigerated vehicles, and they are exported in this form without carrying out manufacturing operations. Work during this period is limited to male workers only. Starting in February (the beginning of production in European countries), artichokes are processed and prepared for export in their various forms, which are:

(A) *Cups*: This operation is performed by female workers only for small-sized Noura, where the outer inflorescence leaves are removed, the rest of the inflorescence leaves are trimmed, and the inflorescence holder is trimmed to a length of 15 cm and preserved in a salt solution until it is supplied to the factory.

(B) *Tablets*: for large Noura, in two stages. The first stage is carried out by the workers, in which all the leaves of the inflorescence are removed along with the inflorescence holder being cut off, and the disks are placed in the preservation solution. The second stage is carried out by the workers, in which the disk is rounded by removing the small hairs from inside the disk and re-placed in a solution. Preservation until supply to the factory.

(C) *Cutting*: By removing all the outer leaves and trimming the inner leaves and cutting off the inflorescence holder, then the discs are placed in the preservation solution by the workers. Then comes the carving process by the workers, where the Noura are cut into pieces whose thickness varies according to the required specifications and are returned to the preservation solution until, they are supplied to the factory.

(d) *Stuffing*: This is done on small Noura at the end of the season due to the low quality of the Noura and the dryness and roughness of their leaves. All the inner and outer leaves are removed, the inflorescence holder is cut, and the inflorescence is placed in the preservation solution by the workers. Then, by the workers, the inflorescence is deeply pruned and put back in the preservation solution. Until supply to the factory.

By reviewing the data in Table No. (10), it is clear that the costs incurred by Al-Nawala are the price of purchasing artichokes, workers' wages, the value of preservatives, and transportation costs to food factories and exporters. The highest processing costs for a ton of artichokes prepared in the form of tablets, pieces, and stuffing amounted to about 8.64 thousand Pounds, followed by the costs of processing artichokes in the form of cups at about 5.12 thousand pounds, while the costs of processing a ton of fresh artichokes were the lowest, amounting to about 2.055 thousand pounds. The added value (marketing margin) of the processed ton in its various forms was highest for the stuffed artichokes and then the pieces, with a value of about 21, 15 thousand pounds for each, respectively, followed by the artichoke discs, then cups, and the least of them was the fresh artichokes, with a value of about 14.5, 14.25, and 10.5 thousand pounds for each. Of them in order. The net profit per ton processed also reached its maximum in the case of artichokes prepared in the form of stuffing, followed by cupped artichokes and then pieces, at a value of about 12.36, 9.13, and 6.36 thousand pounds for each of them, respectively, with a net profit per

inflorescence of about 0.88, 0.76, and 0.64 piasters for each of them, in the same order. While the net profit for artichokes prepared in the form of tablets amounted to about 5.86 thousand pounds, with a net profit of 0.45 piasters per inflorescence, and finally a ton of fresh artichokes, with a net profit of about 8.45 pounds per inflorescence, about 0.84 piasters.

Table 10: Average processing and marketing costs and the added value of Artichoke processing station in the study sample

Item	Unit	Type of processing of artichoke Noura					
		Fresh	cups	Tablets	cutoff	stuffing	
Number of Noura per ton	Noura	10000	12000	13000	10000	14000	
Noura price	Pound/Noura	5.5	3.8	3.5	3.0	3.5	
The value of Noura	Pound	55000	45000	45500	30000	49000	
Processing costs	Workers' wages	pound/ton	4800	4800	8320	8320	8320
	Value of preservatives	pound/ton	120	120	120	120	120
	transportation fees	pound/ton	200	200	200	200	200
	Total processing costs	pound/ton	5120	5120	8640	8640	8640
Total costs	pound/ton	57055	50120	54140	38640	57640	
Selling price per ton	pound/ton	65500	59250	60000	45000	70000	
Value added per ton	pound/ton	10500	14250	14500	15000	21000	
Net profit per ton	pound/ton	8445	9130	5860	6360	12360	
Net profit for Noura	Pound/Noura	0.84	0.76	0.45	0.64	0.88	

Source: Collected and calculated from questionnaire data for the study sample.

(4) *Food factories and exporters:* Factories receive artichokes from loom owners in their various forms by weight after filtering them from the preservation solution and deducting approximately 5% of the absorption rate with the preservation solution. They record the weight in the supply card without specifying a price, which is determined in light of external demand on a weekly or monthly basis and sometimes at the end of the season. The artichokes are boiled and then preserved by freezing, pickling, or canning in containers of different capacities according to export requirements, after grading the artichokes into discs according to their diameter, cutting artichokes according to the thickness of the slice, and stuffing artichokes according to the number of Noura per kilogram. As for cupped artichokes, they are not processed. The grading process and the percentage of loss during the manufacturing stages is estimated at about 2% of the weight supplied to the factory.

It is clear from the data presented in Table No. (11) That the marketing costs borne by food factories and exporters per ton of artichoke produced are represented in the costs of sorting and grading, boiling, packing, refrigerated transportation to the export port, and export fees. The highest costs were for the prepared artichokes, at about 8,355 thousand pounds, followed by the artichokes. Prepared as tablets cost about 6.28 thousand pounds, then stuffed and fresh artichokes cost about 5.73 and 3.68 thousand pounds each, respectively, while marketing costs were lowest in the case of artichokes prepared in cups at about 2.88 thousand pounds. It was also found that export prices were highest for stuffed artichokes, followed by disks and then cups, at a value of about 1.80, 1.71, and 1.6 thousand dollars/ton for each of them, respectively. They decreased to about 1.52 and 1.51 thousand dollars/ton for cut and fresh artichokes, respectively. The highest added value was for artichokes in pieces, followed by disks, then artichokes in cups, at a value of about 26.68, 20.61, and 15.95 thousand pounds per ton for each of them, respectively. It decreased to about 14.6 and 5.7 thousand pounds/ton for stuffing and fresh artichokes, respectively. The results indicate that the net profit per ton of artichoke reached its maximum for artichokes prepared in pieces, followed by disks and then cups, at a value of 18.32, 14.32, and 13.07 thousand pounds/ton for each of them, respectively. It decreased to about 8.87 thousand pounds/ton for stuffed and fresh artichokes, respectively.

Table 11. Average processing and marketing costs and added value per ton of artichoke for food factories and exporters in the study sample

Item	Prepared artichoke type					
	Fresh	cups	Tablets	cutoff	stuffing	
Cost of purchasing artichokes	65500	59250	60000	45000	70000	
eting costs	Sorting and grading	1155	0	2200	2475	1650
	Boiling	0	0	600	600	600
	Packing	2040	2400	3000	4800	3000

Refrigerated transportation fees	350	350	350	350	350
Total marketing costs	130	130	130	130	130
Total costs	3675	2880	6280	8355	5730
Export price in dollars	69175	62130	66280	53355	75730
*Export price in pounds	1515	1600	1715	1525	1800
Value Added	71205	75200	80605	71675	84600
Net profit per ton	5705	15950	20605	26675	14600
	2030	13070	14325	18320	8870

The average exchange rate for the dollar is 47 pounds in 2024.

Source: Collected and calculated from questionnaire data for the study sample.

Fourth: General characteristics of the value chain of the artichoke crop in the study sample: Analysis of the artichoke value chain in the study sample showed that it has the following characteristics:

- (1) The main players in the artichoke value chain include: suppliers of production inputs (seeds, fertilizers, pesticides, etc.), farmers, importers, processing station, food factories and exporters, wholesalers, retailers and consumers.
- (2) There are significant differences and differences between the artichoke value chain links in prices and value added by actors in the chain.
- (3) The price of artichoke is subject to fluctuations during the season, and the prices are set by major exporters and manufacturers who raise or lower the price according to the situation of domestic supply and external demand. Major exporters and manufacturers are the organizers of the value chain, and the role of farmers in managing the value chain is minimal.
- (4) Exporting prepared artichokes achieves a higher added value than exporting fresh ones, which is reflected in all parties of the value chain. Therefore, the export of prepared artichokes must be expanded, as it provides more job opportunities in the processing and manufacturing processes, and preventing the exploitation of Egyptian artichokes in some countries. Which imports it, then manufactures it and re-exports it, thus occupying a large percentage of the market and achieving huge profits at the expense of the Egyptian product “like Italy.”
- (5) Real information about the market, prices and specifications is not available and is not available to all parties of the chain on a regular and updated basis, and there is no system for communicating this information to all parties.
- (6) The means of transportation used to transport prepared artichokes from processing station to food factories are mostly inappropriate or not equipped with transport coolers to preserve the goods from spoilage.
- (7) The average number of workers at the station is 36 workers per day, which means that the artichoke sector accommodates about 18 thousand workers, and there is a clear division of labor between males and females in the artichoke processing operations, which are considered one of the female labor-intensive products, and the average percentage of male workers ranges from Females between 1:3.
- (8) Women play a clear and effective role in the processing of artichokes and other vegetables, which clearly demonstrates that women clearly contribute to the value chain. However, the environment and working conditions in some artichoke processing plants may not be suitable for female work, and their means of transportation may expose them to many risks.
- (9) Some stations work outside the artichoke season to pre-process some other vegetables, as well as prepare some fruits for juice, due to their availability in the region and do not require a lot of labor and do not pose any risks.
- (10) About 50% of the stations do not prepare vegetables other than artichokes, especially small ones, which indicates that there are untapped potentials and idle capacities throughout the year in those stations.
- (11) Artichoke processing operations in general are not well developed, as stations for processing artichokes and other vegetables rely on the use of primitive tools, and there are a limited number of large stations that own a semi-truck that is not equipped with a refrigerated container.
- (12) Value chain financing for artichokes is characterized by internal financing, that is, it takes place within the chain, where the importers provide financing to the farmers, and the processing station lend to the importers.
- (13) High returns to all actors in the artichoke value chain.
- (14) Marketing Window for Egyptian artichokes; it depends mainly on the beginning of production in competing European countries, which begins at the end of January. The length of the fresh artichoke export season also depends on the weather conditions in these countries, as frost waves affect artichoke production there, which leads to an increase in the export share of artichokes. Egyptian.

- (15) Artichoke prices are sensitive as they are subject to fluctuations during the season. Prices during the current season were higher compared to the prices of the previous year due to the decrease in cultivated area and lack of local production, on the one hand, as well as the frost wave that swept European countries, on the other hand.
- (16) The artichoke market has a limited number of exporters and factories (10-15), which makes them enjoy a controlling position in setting prices (they are considered price leaders) for both fresh and manufactured artichokes, guided by their contracts with the external market (especially external demand in the market). Italy, which is the main market for Egyptian artichoke exports), and in light of the competition between them.
- (17) Lack of transparency in dealings between factories and station owners, as:
 - Major exporters do not announce prices at the beginning of the season or before supplying agreed-upon quantities.
 - Prices are not recorded in the factory’s supply documents (card), but only the quantities supplied from the station are recorded. Indicative (initial) prices are announced weekly.
 - Settlement of accounts and payment of remaining dues takes place at the end of the season, and sometimes this settlement is delayed until the beginning of the next season, in addition to its impact on the cash liquidity available during the season, especially for small stations.

Fifth: Identifying the strengths and weaknesses of the artichoke value chain links in the study sample:

1. General indicators:

Strength Aspects	Weaknesses
<ol style="list-style-type: none"> 1. There is a large population in the region that depends on artichoke cultivation and processing and other related economic activities. 2. The reputation and fame of markets Egyptian artichokes in foreign. 3. Market growth and expansion. 4. Increase sales volume and increase revenues. 5. There is a noticeable increase in foreign demand for artichokes and an increase in the volume and value of its foreign trade. 6. Providing new job opportunities. 7. There is potential for organic products market. 8. There are opportunities in other sectors such as cosmetics, pharmaceutical and feed industry. 	<ol style="list-style-type: none"> 1- The activity requires more investments. 2- Prices are less stable 3- Artichoke marketing needs improvement in terms of management and brand development. 4- Negotiation skills are very limited. 5- Failure to meet international standards and standards. 6- Lack of research directed at improving productivity 7- Lack of linkage between research centers, farmers, artichoke processing stations and factories to identify and produce types of artichokes suitable for processing.

2. Farmers:

Strength aspects	Weaknesses
<ol style="list-style-type: none"> 1. Controlling the quantity of production and the timing of its appearance. 2. Controlling quality requirements related to chemical fertilizers and pesticides. 	<ol style="list-style-type: none"> 1. Poor financial capacity. 2. He has no role in determining the price. 3. The link in the chain most affected by price fluctuations

3. Broker:

Strength aspects	Weaknesses
<ol style="list-style-type: none"> 1. Fulfilling agreements. 2. Financial capabilities. 3. Low risk. 	<ol style="list-style-type: none"> 1. Sometimes inability to supply the required quantities on time. 2. Failure to strictly adhere to quality specifications.

4. Processing station:

Strength aspects	Weaknesses
------------------	------------

<ol style="list-style-type: none"> 1. They have more financial resources. 2. They have good abilities to monitor their activity. 3. Their workers are more trained. 4. The possibility of continuing to work after the end of the artichoke season by preparing other vegetables and fruits. 	<ol style="list-style-type: none"> 1. Increased competition. 2. Competition with other producers to obtain the services of trained female workers. 3. Most production facilities lack the basic needs of female workers and hygiene. 4. Water management problems resulting from processing. 5. Unprofessional management systems. 6. Not taking advantage of the most effective modern technologies. 7. Lack of experience for some loom owners. 8. Most processing stations are not licensed. 9. Licensing processing stations exposes their owners to more taxes. 10. Difficulties in meeting station licensing requirements. 11. Low levels of formal adoption and accreditation of food safety standards, standards and quality systems. 12. Failure to strictly adhere to quality specifications. 13. Failure to follow methods to preserve the environment.
--	---

5. Food factories and exporters:

Strength aspects	Weaknesses
<ol style="list-style-type: none"> 1. They can accommodate large volumes of production. 2. They have access to export market channels. 3. The possibility of opening new marketing channels. 4. Limited number of exporters. 5. The possibility of introducing new ideas or new technology into production. 	<ol style="list-style-type: none"> 1. Failure to adhere to agreed upon prices. 2. Failure to record prices and quantities in supply documents. 3. Lack of transparency and exchange of market information. 4. Postponing the payment and settlement of loom dues until the end of the season.

5. Conclusion

In light of the findings of the study, it recommends establishing an artichoke marketing unit in the study area that includes actors in the value chain and strengthens the horizontal and vertical links between them. Its mission will be to provide market information, especially with regard to external prices, export opportunities, and specifications required for export to bring together the parties of the chain, and to strengthen the negotiating position in particular. For farmers and owners of processing stations in the face of the monopolistic situation of factories and exporters, concluding contracts between the parties and following up on their fulfillment.

6. Reference

Aoun Khairallah Aoun, (1997), *The Economics of Artichoke Production in Beheira Governorate*, Sixth Conference on Economics and Development in Egypt and the Arab Countries, Department of Agricultural Economics, Faculty of Agriculture, Mansoura University, Volume One.

Fries, B. (2007) 'The value chain framework, rural finance, and lessons for TA providers and donors', presentation at the Asia International Conference

Ministry of Agriculture and Land Reclamation (2022), Economic Affairs Sector, Agricultural Statistics Bulletin.

Ministry of Agriculture and Land Reclamation (2022), Economic Affairs Sector, Bulletin of Foreign Trade Statistics for Agricultural Exports and Imports, Issue (15).

Ministry of Agriculture and Land Reclamation, Beheira Agriculture Directorate, Statistics Department, unpublished data.

Miller, C. and da Silva, C. (2010) 'Value chain financing in agriculture', Enterprise Development and Microfinance 13(2/3), Practical Action Publishing, Rugby.

Miller, C. and Linda Jones, (2013) "Agricultural Value Chain Finance–Tools and Lessons", Practical Action Publishing Ltd, FAO.

Tamer Mohamed Adlan (2016), Economic Study of Artichoke Production, Marketing and Manufacturing in Beheira Governorate, Damanhur University, Alexandria Journal for Scientific Exchange, Magazine (37), Issue (1).

The Food and Agriculture Organization's website on the international information network www.fostst.org.

Porter, M., (1985), "Competitive Advantage", creating and sustaining superior performance, New York, the Free Press.

World Trade Organization database, www.trademap.org database.