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Economic analysis of the value chain of sugar beet crop in Beheira Governorate

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Abstract: The value chain analysis approach is an important tool for developing marketing systems and enhancing the competitiveness of agricultural products. The research object to study the value chain of the sugar beet crop in Beheira Governorate by drawing the value chain and studying the production relationship represented in farms and the rest of its links, including sugar manufacturing, marketing represented by the wholesaler and retailer in order to determine the strengths and weaknesses of the current series and develop proposals, the results showed that the average productivity of feddan (Feddan = 4200m^2) of sugar beet crop in Beheira Governorate amounted to 23 Tons/ Feddan, and the average cost of production per feddan was about 13038 EGP/feddan, and the value of the total revenue was about 18853 EGP/Feddan, which It resulted in a net return about 5816 EGP/Feddan in the research sample. Estimates of profitability indicators for sugar beet farmers in Beheira Governorate showed that the ratio of revenue to costs amounted to 145%, and the relative profitability is about 72.4%. The profit margin for the farmer per ton of sugar beet was estimated at 253 EGP/Ton, which led to achieving a high return for the farmer on the invested pound amount to 45piasters/pounds. The product incentive amounted to 31.6%, and by estimating the criteria for measuring the productive risks of farms, break-even production amounted 11.14 Tons/Feddan, the production safety limit was 51.6%, and the price safety limit was 56.1%. This means that the sugar beet farmer will be more able to cope with the potential decline in production and selling price. The results of the research also showed that the value added achieved in the various links of the value chain for sugar beet for farms was 15071 EGP/Feddan, and for the sugar factory about 2484 EGP/ Ton, the wholesaler about 708 EGP/Ton and an estimate of the marketing efficiency of each of the sugar beet farms, the sugar factory and the wholesaler. And it amounted to 32.3% 75.9% 93.7% for each of them, respectively, and it is clear from this that the marketing margin of the farmer is greater than the marketing margin of the sugar factory and the wholesaler, i.e. there is an inverse relationship between the marketing margin and the marketing efficiency, that is, the greater the marketing margin, the lower the marketing efficiency and vice versa. The research results indicated that the consumers pound for beet sugar can be distributed by studying the share of the sugar producer, wholesaler and retailer of the consumers pound, reached about 86%, 8%, 6% respectively. By conducting an analysis of the value chain of the sugar beet crop in Beheira Governorate, it was found that the strengths are the rapid turnover of capital, the availability of experience in agriculture and the availability of job opportunities the sugar beet crop is a strategic crop, as it is the best alternative to increase sugar production, while the weaknesses are the high rates of sugar beet, the production and marketing risk, the lack of production links, the monopoly of factories for sugar beet seeds, and the control of the price of the crop.

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Introduction:

Sugar beet is considered one of the strategic crops, as it is the best alternative to increase sugar production and increase its self-sufficiency compared to the sugar cane crop due to the difficulty of expanding its cultivation for the current scarcity of water resources in Egypt. Also, the sugar beet crop occupies an important place in Egyptian agriculture in terms of the total cultivated area. The amount of about 517.9 thousand feddans represents about 7.1% of the total area of winter field crops amount to 7266.8 thousand feddans and about 60.6% of the area of sugar crops amount to 854.1 thousand feddans for the year 2020 at the level of Egypt,Sugar beet production amount to 10,669.7 thousand tons, with a value of 6.7 million pounds for the year 2020, representing about 37.5% of the total value of sugar crops amount to 17.85 million pounds for the year 2020, and therefore

it was necessary to pay attention to the horizontal and vertical expansion in the cultivation and production of the sugar beet crop because of its impact on reducing the food gap from sugar and work on stabilizing local prices for it, by following modern scientific methods in cultivating the crop from agricultural technical transactions to harvesting and supplying the crop to sugar production companies.

Research problem:

Producers of sugar crops, especially the sugar beet crop, are exposed to a decrease in the profit margin as a result of the over increasing in production or service costs in addition to the low agricultural price of the crop, which requires studying all means that would reduce production costs and increase the net yield of it, despite the increase that has been achieved in the production of sugar crops in Egypt, there is still a gap between the production and consumption of sugar, as this gap witnesses an increase in light of the trend of state policies to reduce the cultivation of water-hungry crops, including the sugar cane crop, which affects the size of the food gap between the production and consumption of sugar, which calls for the necessity to study the integration between all stages, including (sugar beet production, sugar industry, marketing) and not to deal with each stage separately to raise the efficiency of the value chain of the sugar beet crop to maximize the economic return from the crop and reach a more sustainable value chain.

Research objective:

Research objective to:

1. Study of the current situation of sugar beet crop in Egypt and Beheira Governorate during the period 2006-2021.
2. Study the current situation of local sugar production and consumption in Egypt during the period 2006-2020.
3. Study of the current situation of world sugar production during the period 20019-2021.
4. Value chain analysis of sugar beet crop in the study sample in Beheira Governorate.
5. Estimate the marketing margin and the marketing efficiency of each of the sugar beet farms, the sugar producer (factory) and the wholesaler in the study sample.

Materials and methods:

In achieving its objectives, the research relied on the use of the descriptive and quantitative analytical method using arithmetic averages and percentages and the use of the growth equation in estimating the equations of the general time trend, as well as estimating economic indicators such as profitability, net income, value added, marketing margins and marketing efficiency used in analyzing the value chain of the sugar beet crop in a sample. The study that was selected in the center (Hosh Essa, Damanhur, Abu Hummus) besides using the risk criteria, which is the break-even point and the production and price safety limit for the sugar beet producer in Beheira Governorate.

The research used, when measuring the economic and marketing efficiency, some criteria, including the following:

1. **Relative profitability**: It is the farm's ability to use its resources to obtain revenues that exceed its expenses, ie, the farm's ability to reap profits from its operations. Relative profitability = (net return feddans / variable costs) x100
2. **Net farm income**: It is an indicator of the efficiency of the production elements on the farm. It expresses the income of the family work, the income of the invested capital, and the income of the farm administrative work, which represents (the profit of the farm), which is = (the value of the output - the value of the total costs).
3. **Value added**: It is the value that is added to the product during each stage of production and distribution, as a result of the transformational and operational processes that take place on it by converting raw materials into a final value, which is (production value - value of production inputs).
4. **Marketing margin**: It is the selling price of a unit of output minus the value of production inputs for that unit.
5. **Marketing efficiency**: It is the product of marketing activities, which is represented in the ability to satisfy the consumer's desires for agricultural and industrial commodities and the extent of the amount of resources used within the production process, which is represented in the following equation: Marketing efficiency = (100 - (marketing margins /selling price per unit) x100).
6. **Productive safety limit**: It is the percentage which production capacity can decrease without entering the loss area, and it reflects the ability to withstand unfavorable economic conditions and is represented in the following equation: Production safety limit = ((actual production volume - break-even production)/actual production volume) x 100.
7. **Price safety limit**: criterion that measures the degree of sensitivity to a decrease in prices without entering the loss zone, which is = ((average selling price - break-even price) /average selling price) x 100.

Data sources:

The research relied on two types of data: the first is the published and unpublished secondary data from the Directorate of Agriculture in Beheira and (Bulletin of Agricultural Statistics, Food Balance) affiliated to the Economic Affairs Sector of the Ministry of Agriculture and Land Reclamation, and

the second: the primary data collected through a stratified random research sample where it was collected their data was obtained by means of a questionnaire form from the centers (Hosh Essa, Damanhur, Abu Hummus) and the selection of these centers is due to the fact that they are the largest centers in the area of sugar beet crop for the winter season in the research sample in Beheira Governorate.

The research sample:

- **The relative importance of the area of the winter sugar beet crop under study in Beheira Governorate for the production season 2021/2022.**

It was clear from Table1. That each of Hosh Essa, Damanhur and Abu Hummus centers in Beheira governorate occupies the first, second and third place in the cultivation of the winter sugar beet crop for the production season 2021/2022, where the area of the crop reached about 5490, 3952, 3517 feddan, each of them on the arrangement represents about 49% of the total area of sugar beet at the level of Beheira governorate, which is about 26,455 feddans, and this area represents 4.2% of the total area of winter crops at the governorate level.

Table1. Total area of sugar beet crop for the winter season in Beheira Governorate for the production season 2021/2022.

The Centers	Area* of sugar beet	%	Area of winter crops	%
Hosh Issa	5490	20.8	52092	0.87
Damanhur	3952	14.9	58895	0.63
Abu Hummus	3517	13.3	81568	0.56
Abu El Matamir	2785	10.5	39610	0.44
El Delengat	2646	10.0	70989	0.42
Janakles	1897	7.20	22762	0.30
Edku	1686	6.40	20632	0.27
Shubrakhit	1293	4.90	35034	0.20
El Rahmaniya	1168	4.40	16129	0.18
El Mahmoudia	817	3.10	32656	0.13
Itay El Barud	512	1.90	43060	0.08
Kafr El Dawwar	359	1.40	71025	0.06
Wadi El Natrun	168	0.60	4648	0.03
Koum Hamada	165	0.60	61181	0.03
Rashid	0	0.00	21763	0.00
15	**26455**	**100**	**632044**	**4.20**

*Area = feddan

Source: Compiled and calculated from: the Directorate of Agriculture in Beheira, statistics Department, and unpublished data.

- **Determine the size of the research sample within the selected agricultural associations in each center according to the relative importance of the number of farmers:**

By reviewing the data contained in Table No.2, it was found that the agricultural associations were selected within each of the centers representing the sample according to the relative importance of the number of farmers for the winter sugar beet crop under study in the Beheira Governorate, where the number of observations in the research sample under study for the crop was determined by taking 5% of the total number of farmers of these crops within the selected agricultural associations.

Table2.The size of the research sample within the agricultural associations selected in each center for the winter sugar beet crop in Beheira Governorate 2021/2022.

The Centers	Area of sugar beet		number of farmers			5%	number of observations
	agricultural association	feddan	The Center	The association	%		
Hosh Issa	Hosh Issa	1310	1953	447	22.9	1900	95
	Abu Ashuqaf	1100		400	20.5		
Damanhur	Sharnoop	595	2635	298	11.3		
Abu Hummus	Boutros	1233	2078	755	36.3		
Total	**4**	**4238**	**4713**	**1900**	**40.3**		

Source: Compiled and calculated from: the Directorate of Agriculture in Beheira, statistics Department, and unpublished data.

Where the number of selected observations of the sugar beet crop in Beheira governorate was determined at the level of (Hosh Essa, Damanhur, Abu Hummus) 95 observations of the total farmers of the crop amount to 1900 farmers in agricultural associations (Hosh Issa, Abu Ashuqaf) in Hosh Essa Center, Sharnoop Association in Damanhur Center, Boutros Association in Abu Hummus Center.

Results and Discussion

First: The current status of the sugar beet crop in Egypt and Beheira Governorate during the period 2006-2021.

The data in Table No.3, indicate that the area planted with the sugar beet crop in Egypt amounted to about 186.4 thousand feddans in 2006, increased to about 682.8 thousand feddans in 2021, with an increase about 266%, while the area of the crop in Beheira governorate increased from 4.5 thousand feddans in 2006 to 41.2 thousand feddans in 2021, an increase of about 815%.

This resulted in an increase in the total production of the sugar beet crop in Egypt from 3,821.2 thousand tons in 2006 to 14,202.2 thousand tons in 2021, with an increase of 272%, As for the Beheira, production increased from 77 thousand tons in 2006 to reach 766.3 thousand tons in 2021, with an increase of about 895%, due to the increase in the area and productivity of feddans.

Table3. Area and production of sugar beet in Egypt and Beheira Governorate during the period 2006-2021.

Years	Egypt			Beheira Governorate		
	Area Thousand Feddan	**Productivity** ton	**Production** Thousand tons	**Area** Thousand Feddan	**Productivity** ton	**Production** Thousand tons
2006	186.4	20.5	3821.20	4.50	17.1	77.00
2007	248.3	20.4	5065.30	8.40	17.7	148.7
2008	257.7	20.3	5230.60	11.2	17.5	195.1
2009	264.6	20.4	5397.80	25.9	17.8	460.7
2010	313.2	20.5	6421.50	30.6	18.2	556.9
2011	361.9	20.7	7491.20	35.3	18.5	653.4
2012	423.8	20.8	8814.10	32.0	18.5	592.7
2013	460.5	20.9	9624.20	36.6	18.6	681.3
2014	496.3	20.9	10371.7	40.8	18.9	770.4
2015	512.0	20.9	10700.3	44.2	18.5	817.3
2016	527.7	20.8	10976.2	41.9	18.1	757.9
2017	523.4	20.8	10886.3	39.6	19.9	787.4
2018	514.4	20.6	10595.7	39.9	20.9	833.9
2019	516.2	20.6	10632.7	38.8	20.2	783.5
2020	517.9	20.6	10669.7	37.7	19.4	731.0
2021	682.8	20.8	14202.2	41.2	18.6	766.3
Average	**425.4**	**20.7**	**8806.30**	**31.8**	**18.7**	**600.8**

Source: Compiled and calculated from: Ministry of Agriculture, Economic Affairs Sector, Central Administration of Agricultural Economy, Agricultural Statistics Bulletin, Cairo, miscellaneous issues.

The results of estimating the general trend equations for the area and production of sugar beet in Egypt and Beheira in Table No.4, indicate that the significant increase in the area of sugar beet in Egypt and Beheira governorate amounted to 29.8, 3.5 thousand feddans, with an annual increase rate about 7.2%, 10.9% of the average area the amount of about 425.4 and 31.8 thousand feddans, respectively, during the study period, which was reflected in the increase in sugar beet production at the level of Egypt and Beheira Governorate, with a statistically significant annual increase rate about 7.3%, 11.8%, respectively.

Second: The current situation of sugar production and consumption, sugar gap and beet sugar production in Egypt during the period 2006-2020.

It was clear from the data of Table No.5, the increase in both production and domestic consumption of sugar during the period (2006-2020) from (1575, 1936) thousand tons in 2006 about (2282, 3335) thousand tons in 2020, an estimated increase of about (44.9%, 72.3%) respectively, and the per capita share increased from 26.9 kg/year in 2006 to about 32.8 kg/year in 2020, with an increase of about 21.9%. This is an increase in the sugar gap from 361 thousand tons in 2006 to 1053 thousand tons in 2020, with an estimated increase about 191.7%, means that the production covers about 69.8% of the local

Table6. Results of estimating the growth function for production and consumption of sugar and the sugar gap in

consumption of sugar. About 503 thousand tons in 2006 and 1417 thousand tons in 2020, an increase rate was about 181.7%, therefore, crop contributes about 50.3% of the total sugar production during the study period.

Table 4. Results of estimating the growth function for the area and production of the sugar beet crop in Egypt and Beheira Governorate during the study period.

Item	equation	average period	% Annual growth rate	t_{b1}	F	R^2
Egypt						
Area	LnY = 5.38 + 0.072T	425.40	7.20	9.80**	96.0**	0.87
Productivity	LnY = 3.02 + 0.001T	20.7	0.10	2.40*	5.70*	0.29
Production	LnY = 8.41 + 0.073T	8806.3	7.30	9.50**	90.0**	0.86
Beheira						
Area	LnY = 2.40 + 0.109T	31.80	10.9	4.45**	20.0**	0.59
Productivity	LnY = 2.85 + 0.009T	18.7	0.90	4.70**	22.0**	0.61
Production	LnY = 2.53 + 0.118T	600.8	11.8	4.70**	22.4**	0.62

** Significant at 1% probability level. * Significant at 0.05% probability level. t_{b1}= time coefficient.
Source: calculated from the data in table3.

Table5. Production and consumption of sugar and the sugar gap in Egypt during the period 2006-2021.

Years	total sugar production thousand tons	Beet sugar production Thousand tons	%	Total consumption of sugar Thousand tons	sugar gap thousand tons	%	Average per capita KG.per Year
2006	1575	503	31.9	1936	361	81.4	26.9
2007	1579	505	32	2001	422	78.9	27.1
2008	1582	507	32	2361	779	67	31.3
2009	1610	597	37.1	2561	951	62.9	35.4
2010	1754	755	43	2714	960	64.6	35.1
2011	1898	913	48.1	2868	970	66.2	35.7
2012	2005	1004	50.1	2991	986	67	34.8
2013	1998	1060	53.1	2950	952	67.7	35.1
2014	2123	1274	60	3040	917	69.8	34.7
2015	2248	1347	59.9	3134	886	71.7	33.3
2016	2197	1266	57.6	3052	855	72	31.7
2017	2249	1325	58.9	3128	879	71.9	31.4
2018	2163	1248	57.7	3096	933	69.9	31.2
2019	2223	1333	60	3270	1047	68	32.7
2020	2282	1417	62.1	3335	1053	68.4	32.8
Average	**1966**	**1004**	**50.3**	**2829**	**863**	**69.8**	**32.6**

Source: Compiled and calculated from: Ministry of Agriculture, Economic Affairs Sector, Central Administration of Agricultural Economy, Food Balance Bulletin, Cairo, miscellaneous issues.

The results of estimating the growth function presented in Table No.6, showed that the increase in the local consumption of sugar in Egypt amounted to 96.2 thousand tons, with a statistically significant increase rate of about 3.4%, higher than the increase in the local production of sugar, which amounted to 60.95 thousand tons, with an annual increase rate. 3.1%, as a result of which the sugar gap in Egypt increased about 39.7 thousand tons at an annual increase rate of about 4.6% during the study period, while sugar production from sugar beets in Egypt increased by 83.3 thousand tons with an annual increase rate of about 8.3% of the average production, which indicates the importance of sweetened sugar from sugar beet crop compared to sugar cane crop.

Egypt during the study period.

Item	equation	average period	% Annual growth rate	t_{b1}	F	R^2
total sugar production	LnY = 7.33 + 0.031T	1966	3.1	10.2^{**}	104^{**}	0.89
Beet sugar production	LnY = 6.20 + 0.083T	1004	8.3	9.40^{**}	88^{**}	0.87
Total consumption of sugar	LnY = 7.70 + 0.034T	2829	3.4	7.20^{**}	52^{**}	0.80
sugar gap	LnY = 6.40 + 0.046T	863	4.6	3.10^{**}	9.6^{**}	0.42
Average per capita	LnY = 3.44 + 0.006T	32.6	0.6	1.10^{Ns}	1.1^{Ns}	0.08

** Significant at 1% probability level. * Significant at 0.05% probability level. Insignificant = Ns. t_{b1}= time coefficient.
Source: calculated from the data in: table5.

Third: The current situation of world sugar production and the most important producing and exporting countries during the period 2019-2021.

1. The most important sugar-producing countries in the world:

The world production of sugar in 2021, which amounted to 181 million tons, increased by 1.8 million tons compared to its counterpart in 2019, whose production amounted to 179.2 million tons. Brazil ranked first in sugar production with about 33.95 million tons, representing about 19.3% of the average production The world's sugar production during the period (2019-2021), followed by India and even the Philippines, amount to 67% of the total sugar production in the world, which averages about 175.6 million tons. Egypt also ranked 13th out of 17 countries with about 2.642 million tons, representing 1.5% of the world average production. Table No.7.

Table7. The most important sugar-producing countries in the world during the period 2019-2021.
Quantity: million tons

Years / Country	2019	%	2020	%	2021	%	average period	%
Brazil	29.5	16.46	30.3	18.2	42.05	23.23	33.95	19.34
India	34.3	19.14	28.9	17.3	33.76	18.65	32.32	18.41
European Union	16.75	9.35	17.04	10.2	15.91	8.79	16.57	9.44
China	10.76	6.01	10.4	6.2	10.6	5.86	10.59	6.03
Thailand	14.58	8.14	8.294	5.0	7.587	4.19	10.15	5.78
United States	8.164	4.56	7.392	4.4	8.376	4.63	7.977	4.54
Russia	6.08	3.39	7.8	4.7	5.625	3.11	6.502	3.7
Mexico	6.812	3.8	5.596	3.4	6.058	3.35	6.155	3.51
Pakistan	5.27	2.94	5.34	3.2	6.505	3.59	5.705	3.25
Australia	4.725	2.64	4.285	2.6	4.335	2.39	4.448	2.53
Turkey	2.7	1.51	2.75	1.7	3.1	1.71	2.85	1.62
Guatemala	2.966	1.66	2.764	1.7	2.565	1.42	2.765	1.57
Egypt	2.405	1.34	2.74	1.6	2.78	1.54	2.642	1.5
Colombia	2.4	1.34	2.35	1.4	2.24	1.24	2.33	1.33
South Africa	2.257	1.26	2.295	1.4	2.106	1.16	2.219	1.26
Indonesia	2.2	1.23	2.25	1.4	2.13	1.18	2.193	1.25
Philippines	2.1	1.17	2.15	1.3	2.143	1.18	2.131	1.21
Total	153.97	85.9	142.65	85.6	157.87	87.2	151.5	86.3
other countries	25.2	14.1	23.93	14.4	23.14	12.8	24.09	13.7
The total	**179.2**	**100**	**166.6**	**100**	**181**	**100**	**175.6**	**100**

Source: Compiled and calculated from: The website of the US Department of Agriculture USDA.

2. The most important sugar- consuming countries in the world:

By reviewing the data contained in Table No.8, the average world consumption of sugar amounted to 172.5 million tons during the period (20019-2021), and the total world consumption of sugar in 2021 amounted to about 172.7 million tons, with a decrease of 0.3 million tons at a rate of 0.2% from the consumption of sugar in 2019 and India ranked first among the most important countries consuming sugar with about 27.5 million tons, about 15.95% of the average total world consumption during the period (2019-2021), and Sugar-consuming countries in the world from second ranked to seventeen are: (European Union, China, United States, Brazil, Indonesia, Russia, Pakistan, Mexico, Egypt, Turkey, Iran, Bangladesh, Thailand, Philippines, Algeria, Vietnam) represent about 9.84%, 9.03%, 6.40%, 6.07%, 4.22%, 3.39%, 3.23% , 2.48%, 1.87%, 1.68%, 1.44%, 1.44%, 1.39%, 1.33%, 1.20%, 1.11% each, respectively, with a total about 56.15% of the average world consumption of sugar, while the rest the world represented about 27.9 % during the study period.

Table8.The most important sugar- consuming countries in the world during the period 2019-2021.
Quantity: million tons

Years / Country	2019	%	2020	%	2021	%	average period	%
India	27.5	15.9	27	15.7	28	16.21	27.5	15.95
European Union	17	9.83	17	9.9	16.9	9.79	16.97	9.84
China	15.8	9.13	15.4	8.97	15.5	8.98	15.57	9.03
United States	10.98	6.35	11.11	6.47	11.01	6.37	11.03	6.4
Brazil	10.6	6.13	10.65	6.2	10.15	5.88	10.47	6.07
Indonesia	7.055	4.08	7.356	4.28	7.445	4.31	7.285	4.22
Russia	6.021	3.48	6.086	3.54	5.419	3.14	5.842	3.39
Pakistan	5.4	3.12	5.54	3.23	5.75	3.33	5.563	3.23
Mexico	4.317	2.5	4.349	2.53	4.171	2.42	4.279	2.48
Egypt	3.1	1.79	3.25	1.89	3.34	1.93	3.23	1.87
Turkey	2.784	1.61	2.999	1.75	2.914	1.69	2.899	1.68
Iran	2.45	1.42	2.176	1.27	2.821	1.63	2.482	1.44
Bangladesh	2.519	1.46	2.492	1.45	2.426	1.4	2.479	1.44
Thailand	2.48	1.43	2.36	1.37	2.35	1.36	2.397	1.39
Philippines	2.3	1.33	2.3	1.34	2.275	1.32	2.292	1.33
Algeria	2.093	1.21	2.138	1.25	1.977	1.14	2.069	1.2
Vietnam	1.597	0.92	2.064	1.2	2.074	1.2	1.912	1.11
Total	124	71.7	124.27	72.4	124.52	72.1	124.26	72.1
other countries	49	28.3	47.42	27.6	48.17	27.9	48.2	27.9
The total	**173**	**100**	**171.7**	**100**	**172.7**	**100**	**172.5**	**100**

Source: Compiled and calculated from: The website of the US Department of Agriculture USDA.

3. The most important sugar-exporting countries in the world:

World exports of sugar increased in 2019 from 57.84 million tons to 62.34 million tons, an increase of 7.8%, or about 4.5 million tons, over its counterpart in 2019, and it was shown from Table No.9 That Brazil ranked first with an average of about 23.68 million tons, representing about 40. 96% of the average global exports of sugar during the period 2019-2021, and Brazil are one of the most important countries influencing the world sugar export market, as it controls nearly half of the world's sugar exports during that period, enabling it to influence the world price. Thailand, India, Australia, Guatemala, European Union, Mexico, South Africa, Russia, Colombia, Eswatini, Morocco, El Salvador, Nigeria, Saudi Arabia, Mauritius, South Korea ranked second to seventeenth with an average sugar exports of about 7,015, 5,987, 3.578, 1.793, 1.71, 1.619, 1.166, 0.803, 0.753, 0.665, 0.614, 0.523, 0.513, 0.384, 0.371, 0.313 million tons each, respectively. These countries represent about 12.14% of the average world exports of sugar during that period, about 10.36%, 6.19%, 3.10%, 2.96%, 2.80%, 2.02%, 1.39%, 1.30%, 1.15 %, 1.06%, 0.90%, 0.89%, 0.66%, 0.64%, 0.54% for each of them, respectively, or about 48.14%, while the rest of the world represented about 10.9% during the study period.

4. The most important sugar- importing countries in the world:

World sugar imports in 2019 amounted to about 53.73 million tons, which increased to 58.8

million tons in 2021, with an increase of 9.4%, or about 5.1 million tons. On the other hand, Indonesia ranked first with an average of about 5.415 million tons, representing about 9.75% of the average world imports of sugar during the period (2019-2021), then 19 countries come, ranging from about 8.54% from China to Egypt, with 15.51% of the average total world sugar imports, and the 20 countries in Table No.10 represent 70.5% of world sugar imports.

Table9.The most important sugar- exporting countries in the world during the period 2019-2021.
Quantity: million tons

Years / Country	2019	%	2020	%	2021	%	average period	%
Brazil	19.6	33.89	19.28	36.23	32.15	51.57	23.68	40.96
Thailand	10.61	18.35	6.695	12.58	3.739	6	7.015	12.14
India	4.7	8.13	5.8	10.9	7.462	11.97	5.987	10.36
Australia	3.735	6.46	3.6	6.76	3.4	5.45	3.578	6.19
Guatemala	2.125	3.67	1.858	3.49	1.395	2.24	1.793	3.1
European Union	2.411	4.17	1.459	2.74	1.259	2.02	1.71	2.96
Mexico	2.337	4.04	1.285	2.41	1.235	1.98	1.619	2.8
South Africa	1.041	1.8	1.451	2.73	1.007	1.62	1.166	2.02
Russia	0.382	0.66	1.576	2.96	0.451	0.72	0.803	1.39
Colombia	0.801	1.38	0.778	1.46	0.68	1.09	0.753	1.3
Eswatini	0.582	1.01	0.778	1.46	0.634	1.02	0.665	1.15
Morocco	0.497	0.86	0.664	1.25	0.681	1.09	0.614	1.06
El Salvador	0.532	0.92	0.508	0.95	0.529	0.85	0.523	0.9
Nigeria	0.534	0.92	0.497	0.93	0.508	0.81	0.513	0.89
Saudi Arabia	0.353	0.61	0.429	0.81	0.37	0.59	0.384	0.66
Mauritius	0.347	0.6	0.396	0.74	0.369	0.59	0.371	0.64
Korea, South	0.306	0.53	0.313	0.59	0.32	0.51	0.313	0.54
Total	50.9	88	47.37	89	56.19	90.1	51.48	89.1
other countries	6.94	12	5.85	11	6.15	9.9	6.32	10.9
The total	**57.84**	**100**	**53.22**	**100**	**62.34**	**100**	**57.8**	**100**

Source: Compiled and calculated from: The website of the US Department of Agriculture USDA.

Table10.The most important sugar- importing countries in the world during the period 2019-2021.
Quantity: million tons

Years / Country	2019	%	2020	%	2021	%	average period	%
Indonesia	5.362	9.98	4.758	8.79	6.124	10.42	5.415	9.75
China	4.086	7.6	3.808	7.04	6.34	10.78	4.745	8.54
United States	2.785	5.18	3.778	6.98	2.898	4.93	3.154	5.68
Bangladesh	2.429	4.52	2.397	4.43	2.351	4	2.392	4.31
Algeria	2.328	4.33	2.469	4.56	2.258	3.84	2.352	4.23
European Union	2.374	4.42	2.235	4.13	1.792	3.05	2.134	3.84
Malaysia	2.139	3.98	1.966	3.63	2.142	3.64	2.082	3.75
Korea, South	1.999	3.72	1.926	3.56	1.934	3.29	1.953	3.52
Nigeria	1.87	3.48	1.89	3.49	1.88	3.2	1.88	3.38
Saudi Arabia	1.342	2.5	1.42	2.62	1.488	2.53	1.417	2.55
United Arab Emirates	1.579	2.94	0.751	1.39	1.785	3.04	1.372	2.47
Canada	1.268	2.36	1.245	2.3	1.389	2.36	1.301	2.34
Morocco	1.1	2.05	1.328	2.45	1.407	2.39	1.278	2.3
Sudan	1.042	1.94	1.528	2.82	1.227	2.09	1.266	2.28
Iraq	1.18	2.2	1.196	2.21	1.107	1.88	1.161	2.09
Iran	0.935	1.74	1.111	2.05	1.421	2.42	1.156	2.08
India	1.3	2.42	0.9	1.66	1.243	2.11	1.148	2.07
Japan	1.187	2.21	1.142	2.11	1.051	1.79	1.127	2.03
Vietnam	0.303	0.56	1.312	2.42	1.325	2.25	0.98	1.76
Egypt	0.86	1.6	0.83	1.53	0.83	1.41	0.84	1.51
Total	37.47	69.7	37.99	70.2	41.99	71.4	39.15	70.5
other countries	16.27	30.3	16.12	29.8	16.81	28.6	16.4	29.5
The total	**53.73**	**100**	**54.11**	**100**	**58.8**	**100**	**55.55**	**100**

Source: Compiled and calculated from: The website of the US Department of Agriculture USDA.

Fourth: Value chain analysis of winter sugar beet in the study sample in Beheira Governorate:

Figure No.1, refers to the diagram of the value chain for sugar beet and identifying the actors in it starting from the suppliers of production inputs through the stage of sugar manufacturing to the final consumer, and by addressing the most important links in this chain by analyzing costs and revenues and estimating the added value of each of them as follows.

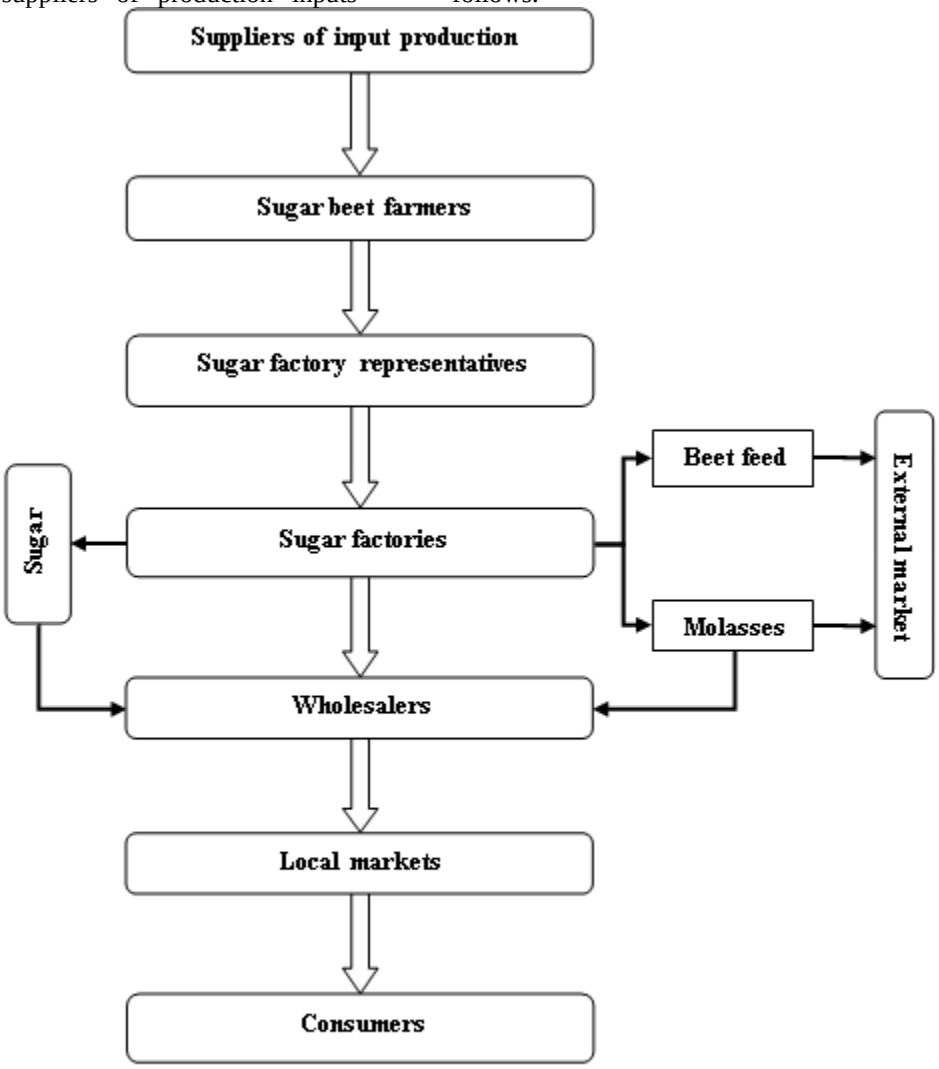

Figure 1: A schematic diagram of the commodity flows

1. Sugar beet farmers:

The sugar beet crop is planted with a triple agricultural cycle, the first: it is planted in the month of August, and the harvest is in the first week of February, i.e. the plant is 180 days old, the second: it is in the month of September and the percentage of germination is high and the incidence of cotton leaf worms is less, the third: it is in the month of October to the week the first of November is characterized by a high germination rate and a low incidence of cotton leaf worms.

A. Feddans production costs and their relative importance to the sugar beet crop in the study sample in Beheira Governorate.

Presenting the data in Table No.11: it was found that the total productive costs of the sugar beet crop in the study sample amounted to about 13038 EGP/feddan, and the constant costs amounted to 5000 EGP/feddan, representing about 38.4% of the total costs, while the variable costs amounted to about 8038 EGP/feddan, representing 61.6% of the total costs per feddan, and the variable costs are divided

into two parts: the first part is the costs of agricultural operations and the second is the costs of production inputs with a value of about 4709 and 3329 EGP/feddan for each, respectively, and at a rate of about 58.6%, 41.4% of the variable costs, respectively.

Table11. Items of production costs and their relative importance for feddan of sugar beet for the winter season in the study sample in Beheira Governorate.

Items	EGP/Fed.	%
Variable costs		
1. Agricultural operations costs	4709	58.6
• **Agricultural labor**		
Preparing the land for farming		
Sugar beet cultivation		
Irrigation		
Spreading of organic and chemical fertilizers	3517	27
Hoeing farmland		
Agricultural Pest Control		
Harvesting the crop		
• **Automated labor**		
Plowing and planning		
Irrigation	1192	9.1
Pesticide spraying		
Harvesting and packing		
2. Production inputs	3329	41.4
Seeds	203	1.6
Manure	-	-
Phosphate fertilizer	658	5.0
Nitrogen fertilizer	1657	12.7
Potassium fertilizer	-	-
Pesticides and Foliar Fertilizer	811	6.2
Total variable cost	8038	61.6
Constant costs (rent land)	5000	38.4
Total costs	**13038**	**100**

EGP =Egyptian Pound

Source: collected and calculated from the data of the questionnaire form in the study sample.

B. Indicators of profitability and average productivity per feddan of sugar beet crop in the study sample in Beheira Governorate.

It was found from the data in Table No.12, that the average feddan productivity of the winter sugar beet crop in Beheira governorate in the study sample amounted to 23tons/feddan and that the average price of a ton of beet in the winter season was 800EGP/ton with a value of 18400EGP/feddan, and it was also found that the by-product of the crop represented In the Green throne as animal feed, it amounted to 2tons/feddan, with an average price of about 227EGP/ton, with a value of 454 EGP/feddan.

Profitability indicators indicate that the net return per feddan in the study sample farms for the sugar beet crop amounted to 5816 EGP/Feddan, and the added value per feddan amounted to about 15071EGP/feddan, while the relative profitability amounted to 72.4% and the ratio of revenues to costs about 145%, which achieved a high return on the invested pound, amounting to 45 piasters/EGP and the farmer's profit margin per ton of sugar beet was estimated at 253EGP/ton, and the producer's incentive amounted to about 31.6piasters/EGP, as shown in Table No.12.

C. Criteria for measuring the productive risk of sugar beet farms according to the study sample in Beheira Governorate.

Table No.13 refers to the criteria for measuring the productive risk of the sugar beet crop in Beheira Governorate. These criteria include:

I. Break-even point or break-even production:

It is worth noting that the break-even production was calculated using the contribution margin method (constant costs / contribution margin) or the equation method (selling price x number of units produced) = (unit variable cost x number of units produced) + constant costs + net profit. In this case, it is assumed that the net profit at the break-even point is zero and the two methods give the same result, and through the equation referred to in the analytical framework of the research, the break-even production volume was estimated at about 11.14 tons/feddan, which is the lowest production level that can be allowed where the total revenues are equal with the total costs, and it was clear by estimating the

value of the break-even revenues that every sugar beet farmer in the study sample achieved a return greater than the break-even point, and he must sell at least at the break-even price of 351 EGP/Ton in order to be able to cover his production costs only, that is, not to make a profit or loss for the farm.

Table12. Indicators of profitability and average productivity per feddan of sugar beet crop in the study sample in Beheira Governorate.

Items	Unit	Ton/Fed.	EGP/Ton.	Value
Main production	Tons/fed.	23	800	18400
By-product	Tons/fed.	2	227	454
Total Revenue	EGP/fed.	-	-	18854
Net Return[1]	EGP/fed.	-	-	5816
Added value[2]	EGP/fed.	-	-	15071
Relative Profitability[3]	%	-	-	72.4
Revenue to costs Ratio[4]	%	-	-	145
Return on Invested[5]	Piaster/EGP	-	-	45
Farmer's profit[6]	EGP/ton	-	-	253
Product incentive[7]	%	-	-	31.6

1. Net Return = total revenue - total Cost,
2. Value added = value of production - value of production inputs
3. Relative Profitability = (net feddan return / variable costs) x 100
4. Revenue to Cost Ratio = (total revenue / total cost) x 100
5. The return on the pound invested = net return / total costs
6. Farmer's profit per ton = net return per feddan / feddan productivity
7. Producer incentive = (profit of the farmer per ton / price per ton) x 100

Source: collected and calculated from the data of the questionnaire form in the study sample.

II. Production safety limit:

And by looking at the results in Table No.13, the production safety limit for sugar beet farms in Beheira Governorate reached 51.6%. This means that the capacity of the farm in the study sample is high in terms of sensitivity to a decrease in production, and therefore its ability to take risks, or is the amount of potential decrease in the volume of sugar beet production that could occur without any loss to the farm.

Table13. Results of the estimate of risk measurement for sugar beet producers in the study sample in Beheira Governorate.

Standards	Unit	Value
Constant cost	EGP/fed.	5000
Variable costs	EGP/fed.	8038
Total production costs	EGP/fed.	13038
Productivity	Tons/fed.	23
Selling price per unit	EGP/ton	800
Unit variable costs[1]	EGP/ton	351
Total production costs per unit	EGP/ton	567
Break-even production[2]	Tons/fed.	11.14
Marginal Profit[3]	EGP/fed.	449
Break-even Revenues[4]	EGP/fed.	9040
Break-even production costs[5]	EGP/fed.	3910
Break-even price[6]	EGP/ton	351
Production Safety Limit[7]	%	51.6
Price Safety Limit[8]	%	56.1

1. Unit variable costs = (total variable costs / quantity of production)
2. Break-even production = Constant costs / (unit selling price - unit variable cost)
3. Marginal Profit or Contribution Margin = (actual unit selling price – unit variable cost)
4. Break-even revenue = (break-even production x actual unit selling price)
5. Break-even production costs = (unit variable costs x break-even production)
6. Break-even price = (break-even point production costs / break-even production)
7. Productive safety limit = ((actual quantity of production - break-even production)/ actual quantity of production) x 100
8. Price Safety Limit = ((actual unit selling price - break-even selling price) / actual unit selling price) x 100

Source: collected and calculated from the data of the questionnaire form in the study sample.

III. Price safety limit:

The results also indicate that the price safety limit for sugar beet farms in Beheira was 56.1%, which means that each product will still make profits even if the selling price decreases by 56.1%, and this indicates the high ability of sugar beet farmers in terms of their sensitivity to a decrease in the selling price, as shown in Table No.13.

2. **Representatives of sugar factories:** represents the link between the farmer and the factory, providing the necessary instructions to the farmer, technical support, supervising the field, delivering production requirements to the farmer, and receiving their salaries from the factory.

3. **Sugar Factory:**

A. Average manufacturing costs and added value per ton of beet sugar for the production season 2021/2022.

By reviewing the data contained in Table No.14, the price of supplying a ton of sugar beet to the factory was about 800 EGP/ton, and since a ton of beet sugar needs about 6.25 tons of sugar beet, the total cost amounted to about 5000 EGP, in addition to 2816 EGP as the costs of manufacturing a ton of sugar. Therefore, the value of production inputs for manufacturing a ton of sugar amounted to 7816 EGP/Ton, as for the outputs of manufacturing beet sugar, they include a ton of sugar at a factory delivery price of 10300 EGP/Ton, and molasses 313 kg at a price of 4.85 EGP/KG, in addition to the sugar beet fodder resulting from the manufacturing process amounted to 375 KG at a price of 5 EGP/ KG. Therefore, the total revenue for manufacturing 6.25 tons of sugar beet amounted to about 13693 pounds, so the net sales revenue from manufacturing a ton of sugar amounted to about 5252 pounds, and the added value of a ton of sugar beet amounted to 2484 EGP/Ton, and the incentive to manufacture about 18 piasters/EGP.

Table14. Average manufacturing costs and added value per ton of beet sugar for the production season 2021/2022.

Items	Unit	Quantity	Value
The price of supplying a ton of sugar beet to the factory	EGP/Ton	-	800
The costs of manufacturing a ton of sugar			
The amount of sugar beet needed to produce a ton of sugar[1]	Tons	6.25	5000
The cost of limestone to produce a ton of sugar[1]	EGP/Ton	-	688
The cost of chemicals to produce a ton of sugar[1]	EGP/Ton	-	1219
The cost of gas needed to produce a ton of sugar[1]	M^3	191	749
The number of empty sacks needed to pack a ton of sugar[1]	sacks/Ton	20	160
The value of production inputs to manufacture a ton of sugar	EGP/Ton	-	7816
The cost of transporting 6.25 tons of sugar beet to the factory	EGP/Ton	-	625
Total production costs of a ton of sugar[2]	EGP/Ton	-	8441
The average price of a ton of sugar	EGP/Ton	-	10300
Sugar revenue generated from 6.25 tons of sugar beet[3]	EGP/Ton	-	10300
Secondary product			
The amount of molasses produced from 6.25 tons of sugar beet	KG	313	1518
The amount of fodder produced from 6.25 tons of sugar beet	KG	375	1875
Total sales revenue from manufacturing a ton of sugar[4]	EGP/Ton	-	13693
The net sales revenue from manufacturing a ton of sugar[5]	EGP/Ton	-	5252
The net revenue per ton of sugar[6]	EGP/Ton	-	1859
Value Added[7]	EGP/Ton	-	2484
Manufacturing incentive[8]	%	18	-

1. Value of production inputs = cost (tons of sugar beet + limestone + chemicals + gas + packing sacks).
2. Total production costs of a ton of sugar = value of production inputs + cost of transporting sugar beet to the factory.
3. Revenue of a ton of sugar = price of kg of sugar x quantity of production.
4. Total sales revenue from manufacturing a ton of sugar = value a ton of sugar + value the quantity of fodder + value the quantity of molasses.
5. The net sales revenue from manufacturing a ton of sugar = total (sales revenue - production costs of a ton of sugar).
6. The net revenue per ton of sugar = revenue of a ton of raw sugar - total production costs of a ton of sugar
7. Value added = revenue of a ton of sugar - the value of production inputs for manufacturing a ton of sugar
8. Manufacturing incentive per ton of sugar = (net revenue per ton of sugar / average price per ton of sugar) x 100

Source: Alexandria Sugar Company, official records, unpublished secondary data for the year 2021/2022 and table12.

4. Wholesaler and retailer

Table No.15, shows average selling price of sugar to the wholesaler is about 11.30 EGP/KG, so the revenue of a ton of sugar is estimated at about 11,300 EGP/Ton, and the total expenses incurred by the wholesaler in exchange for carrying out some operations and marketing services for a ton of sugar when marketing it is estimated at about 10902EGP/Ton, which is It included (the value of packing requirements + rent + labor wages + transportation) for a ton of sugar, as a result of which the wholesaler's net sales return from a ton of sugar amounted to 398 EGP/Ton, and the added value of a ton of sugar amounted to about 708 EGP/Ton, and finally the wholesaler's incentive amounted to about 3.5 piasters/EGP.

Table 15. Average marketing costs and added value per ton of beet sugar at the wholesaler level.

Items	Unit	Quantity	Value
rent the place	EGP/Ton	-	40
wages for packing Laborers	EGP/Ton	-	100
Electricity	EGP/Ton	-	20
transportation expenses	EGP/Ton	-	150
The value of the supplies for packing a ton of sugar for wholesaler			
packing bags	-	2.5	100
packet bags	-	1.25	50
Marketing and advertising expenses	EGP/Ton	-	90
Sugar consumption per ton	-	5	52
The cost of a ton of sugar from factory to wholesaler	EGP/Ton	-	10300
The value of the requirements for packing a ton of sugar	EGP/Ton	-	10592
The total cost of packing a ton of sugar for the wholesaler[1]	EGP/Ton	-	10902
The price of a kilogram of sugar from the wholesaler to the retailer	EGP/KG	-	11.30
Revenue of a ton of sugar for the wholesaler[2]	EGP/Ton	-	11300
Wholesaler net sales revenue of tons of sugar[3]	EGP/Ton	-	398
Value Added[4]	EGP/Ton	-	708
The price of a kilogram of sugar from the retailer to the consumer	EGP/KG	-	12
Wholesaler incentive[5]	-	%	3.5

1. Total costs of packing a ton of sugar for the wholesaler = value (supplies for packing a ton of sugar + rent + Laborers' wages + transportation).
2. Revenue per ton of sugar for the wholesaler = price of kg of sugar for the retailer x ton of sugar.
3. The wholesaler's net sales revenue from the ton of sugar = total (sales revenue - the total costs of packing a ton of sugar).
4. The added value = (revenue of a ton of sugar - the value of the requirements for packing a ton of sugar).
5. Wholesaler Incentive = (Net Sales Return / Average Price of a Ton of Sugar).

Source: collected and calculated from the data of the study sample.

Fifth: Estimating the marketing margin and the marketing efficiency for each of the sugar beet farms, the sugar producer and the wholesaler.

1. Estimation of marketing margin and marketing efficiency.

It was found from Table No.11, 14, that the amount of sugar beet needed to produce a ton of sugar amounted to about 6.25 tons of sugar beet, so the feddan productivity of the farmer of beet sugar amounted to about 3.7 tons of sugar, and since the value of its production requirements amounted to about 3329 EGP/Feddan, and thus became the cost of producing a ton Sugar for the farms is about 900 EGP/Ton, so the marketing margin for the farms to produce a ton of sugar is 6971 EGP/Ton of sugar.

It is clear from the data of Table No.16, that the marketing margin for each of the farms, the factory and the wholesaler amounted to about (6971, 2484, 708) EGP/Ton of sugar, which resulted in the marketing efficiency of each of the farms, the factory and the wholesaler amounted to about (32.3%), (75.9%), (93.7%) respectively.

Table 16. Marketing margin and marketing efficiency for each sugar beet farms, sugar producer and wholesaler.

Items	Unit	Beet farms	Sugar producer	Sugar wholesaler
Marketing Margin[1, 2, 3]	EGP/Ton	6971	2484	708
The Price	EGP/Ton	10300	10300	11300
Marketing Efficiency[4,5]	%	32.3	75.9	93.7

1. The marketing margin of the farmer = the price of a ton of sugar from the factory - the value of production inputs.
2. The marketing margin of the Sugar producer = the unit selling price of the product - the value of inputs for manufacturing a ton of sugar.
3. The wholesaler's marketing margin = unit selling price - value of the packing requirements of a ton of sugar.
4. Marketing Efficiency = 100 – (Marketing Margins / (Marketing Margins + Production Costs)) x 100.
5. Marketing Efficiency = 100 – (Marketing Margins / (Unit Selling Price)) x 100.

Source: Calculated from the data of Table 11, 14, 15.

From the previous narrative for estimating the marketing margin and the marketing efficiency, the value of the marketing efficiency of the wholesaler came in the first place, then the factory and finally the farmer in the third place, this shows that the marketing margin of the farmer is greater than the marketing margin of the factory and the wholesaler, that is, there is an inverse relationship between the marketing margin and the marketing efficiency. The greater the marketing margin, the lower the marketing efficiency and vice versa.

2. The share of the producer, wholesaler and retailer of the consumer's pound per ton of sugar.

The study of marketing differences estimation is one of the most important areas of marketing studies, through which the factory's share of the price paid by the final consumer is determined, as well as the share of intermediaries (wholesale, retail), and thus assessing market performance and judging the efficiency of the marketing system from the reality of the data contained in Table No.17, the marketing differences between the factory and the wholesaler were estimated at 1000 EGP/Ton, while the marketing differences between the factory and the sugar retailer amounted to 1700 EGP/Ton. It is noted that the factory's share of the consumer's pound increased, which was estimated at about 86%, and the share of the wholesaler and retailer was about 8%, 6% respectively.

Table 17. The share of the producer sugar and the wholesaler and retailer of the consumed pound per ton of sugar. EGP/Ton

Items	prices			Marketing differences		Consumed pound distribution%		
	Product	Wholesaler	Retailer	Product /wholesaler	Product/retailer	Producer[1]	Wholesaler[2]	Retailer[3]
Value	10300	11300	12000	1000	1700	86	8	6

1. The share of the Sugar producer = (The price of a ton of sugar from the factory / the price of the retailer) x 100.
2. Wholesaler's share = ((Wholesaler price – Factory price) / Retailer price)) x 100.
3. The share of the retailer = ((The retailer's price – The wholesaler's price) / the retailer's price)) x 100.

Source: Calculated from product, wholesale and retail price data in table14, and 15.

References

[1]. Amal Kamel Eid Ramadan, Rania Abdullah Al-Saeed, **study and analysis of the value chain of the potato crop in Menoufia Governorate,** Alexandria Journal for Scientific Exchange, Volume (41), Issue (4), December 2020.

[2]. Dalia Abdel Hamid Yassin, Rania Naguib El-Derini, **Studying the Value Chain of Grapes in Egypt**, Journal of Agricultural Economics and Social Sciences, University of Mansoura, Volume (11), Issue (3), 2020.

[3]. El-Metwally El-Zanaty Saleh, Mohamed Amin Mohamed Karisha, **a comparative study of the economics and production of sugar cane and sugar beet crops in Egypt**, Journal of the Faculty of Agriculture, Minia University, Volume (32), Issue (4), September 2012.

[4]. Hosnia Abdullah Hamad, Zahra Saleh Ahmeida, **Measuring the Marketing Efficiency of Sheep Meat in the Private Sector in Al Jabal Al Akhdar Region in Libya**, Al Jadeed Journal of Agricultural Research, Alexandria University,

Faculty of Agriculture, Saba Pasha, Volume (25), Issue (3), 2020.

[5]. Mamdouh El-Sayed Mahmoud, **Economic Analysis of Sugar Cane Crop and Sugar Production in Egypt**, The Egyptian Journal of Agricultural Economics, Volume (25), Issue (2), June 2015.

[6]. Muhammad Madi Daoud, Taher Muhammad Hassanein and others, **Marketing Efficiency of the Orange Crop in Sharkia Governorate**, Zagazig Journal of Agricultural Economics, Rural Sociology and Agricultural Extension Research, Volume (44), Issue (1), 2017.

[7]. Ministry of Agriculture, Economic Affairs Sector, Central Administration of Agricultural Economy, **Food Balance Bulletin**, Cairo, miscellaneous issues.

[8]. Ministry of Agriculture, Economic Affairs Sector, Central Administration of Agricultural Economy, **Agricultural Statistics Bulletin**, Cairo, miscellaneous issues.

[9]. Nourhan Mohamed Ahmed Ghareeb, Mohamed Salah Kandil and others, **an economic analysis of the marketing margins and price changes of the most important fish species in the transit market in A. R. E**, Journal of the Association of Arab Universities for Agricultural Sciences, Ain Shams University, Cairo, Volume (26), Issue (1), 2018.

[10]. Shehata Abdel Maqsoud Ghoneim, Ahmed Abdel Sattar and others, **an economic study of the marketing efficiency of wheat crop in Gharbia Governorate**, Menoufia Journal of Economic and Social Agricultural Sciences, Volume (6), Issue (9), October 2021.

[11]. Saad Jaafar Ibrahim Al-Falluji, Abdullah Ali Mudhah, **the value chain of fish using the technique of earthen ponds and floating cages in Baghdad Governorate**, the Iraqi Agricultural Science Journal, Volume (47), Issue (5), 2016.

[12]. Suleiman Ibrahim, Mohamed Jaber (2008), **Agricultural Marketing Systems and the Economics of Agriculture and Food**, Part Two, First Edition, Arab Thought House, Egypt.

[13]. The website of the US Department of Agriculture USDA.

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