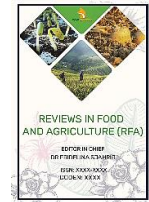




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RESEARCH ARTICLE

THE COMPETITIVENESS OF EGYPTIAN RICE IN THE MAIN GLOBAL MARKETS (ORYZA SATIVA)

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ABSTRACT

Rice is one of the Egyptian agricultural exports, facing numerous changes in the Egyptian economic and political conditions, particularly in recent years. Which leads to the non-stability of the Egyptian agricultural trade balance and the balance of payments, which resulted in a shift of the export map of Egypt. This study aims to evaluate the current situation of Egyptian rice exports and their competitive position in the world market during the period 2000-2020. The results showed that the revealed comparative advantage of Egyptian rice exports irregularly decreased during the study it reached about 6.51 as an average during the study period. The average price competitiveness of Egyptian rice exports (436.73 USD/ton) was less than the counterparts of Thailand, Pakistan, China, the USA, India, and Italy. The first market for Egyptian rice was the Sudanese market with a market penetration rate of about 32.52% (an average for the whole studied period), followed by Syrian (31.08%) and Libyan markets (28.43%). The quantitative, price, and value non-stability coefficient of rice (as average) was estimated at 55, 25, and 67.2%, respectively. The export power of Egyptian rice was estimated at about 10.46% for domestic production and annually decreased by a rate of 1.05% during the study period. Therefore, Egypt gradually lost the export power of Egyptian rice due to a decrease in the local production of rice resulting from the paucity of water Sources. The study recommends that Egypt should pay attention to the trade relations between it and these countries and increase exports and penetrate their markets.

KEYWORDS

Egyptian rice; Export performance; Market penetration rate; market share Indicator.

1. INTRODUCTION

Rice (*Oryza sativa*) is one of the leading food grains for a large number of countries. It represents the staple food for 3 billion people worldwide, especially in the southeast regions (Concepción, 2006; Sumithra et al., 2014). In Egypt, rice is considered an important agricultural crop because it is the only cereal crop in which Egypt achieve self-sufficiency and a surplus for exports. Where Egypt's self-sufficiency rate of rice reached 94.2% in 2017, with an average rice consumption per capita of 38.7 kg versus 34.7 kg in 2016, with a relative increase of 11.5% (CAPMAS, 2017). Rice is also a source of foreign currency that could help to finance economic and social development programs. Besides, rice contributes to many industries, such as rice milling, starch, and animal feed production (Sumithra et al., 2014).

Rice has a low protein content, despite its high nutritional quality. It considers the main source of protein and energy for 15 and 21% of global humans, respectively. Rice also contains minerals, vitamins, and fiber, while the milling process reduces all of the constituents except carbohydrates (Frei and Becker, 2004).

In recent years, countries have been interested in the principle of external competitiveness of their production order to develop their national exports in the general and the agricultural sector, in particular, to achieve the objectives of sustainable economic development (Hassan et al., 2010). At the same time, the American committee for agriculture marketing has defined the competitiveness ability of a particular sector as "the ability of this sector to produce goods and services that meet the needs of international markets while ensuring that real income will be maintained or increased for their citizens" (Hassan et al., 2009).

The trend towards achieving competitiveness and developing trade between developed and developing countries alike has increased in order to take advantage of the rapid pace, that the world has witnessed (Hassan et al., 2009). With the liberalization of international trade, the trend toward globalization, the free economy, and the technological revolution in information and communication, so that the world has become one village (Hoekman, 2004).

The current challenge that faces all Countries is how to get the greatest possible gains or the least possible losses from their foreign trade. Depending on the ability of each country, there is no doubt that achieving

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competition to deal with this new system in the light of the available resources, the methods of production, and how to manage those resources in an investment climate compatible with these variables (Deardorff and Stern, 2002; El-Santresy, 2006).

The most important means of developing Egyptian agricultural exports is to increase their competitiveness through the development of the local marketing system to achieve maximum economic efficiency of the marketing and economic structure (Abd El-Motaleb, 2002; Serin and Abdulkadir, 2008). In light of recent political changes and current international and regional economic blocs, Egyptian agricultural exports, particularly rice exports is facing stiff competition in international markets (Abd El-Fatah, 2009).

Rice production worldwide tends to increase with yield per hectare and harvest area. Where the green revolution became the motivating force for the diffusion of new rice varieties, which produced a high yield per hectare (Yamada, 1997).

The aim of this study is to investigate the situation of Egyptian exports from rice crops compared with total rice exports during the period of 200-2020. It is measured by using the indices of the competitiveness of the Egyptian rice exports or indirectly using some other trade performance indicators. The applied indices for measuring the Egyptian rice trade competitiveness here in this study were:

- (1) The Revealed Comparative Advantage "RCA",
- (2) The Price Competitive Position "PCP".
- (3) The Market Penetration Rate "MPR",
- (4) The market share "MSH",
- (5) The non-stability rate "STR",
- (6) The Export power "EP"

1.1 Research Problem

Despite the distinguished position of Egyptian rice exports among the other major agricultural export crops, there are some international constraints impeding its external trade such as the increased volume of rice exports between the competing countries. The Egyptian rice markets have non-stability of annually exported quantities (The average amount of Egyptian rice exports during the study period was about 871.32 thousand tons, 1244.12 thousand tons for China, 6933.8 thousand tons for India, 698.20 thousand tons for Italy, 3238.3 thousand tons for Pakistan, 8673.34 thousand tons for Thailand and 3149.1 thousand tons for USA), and occurrence of fierce competition by major exporting countries in Egyptian rice markets. Rice also consumes enormous quantities of water irrigation, Therefore, a fixed mechanism should be placed between reducing the local currency price against the dollar to inflation rates while upgrading logistical services and financing for exporters' support studies in cooperation with commercial representation offices.

Therefore, the research aims to evaluate the current situation of Egyptian rice exports and evaluate Egypt's competitive position in foreign markets during the period of 2000-2020.

2. MATERIALS AND METHODS

2.1 Data sources

The main sources of the data used in this research were the periodicals published by the Central Agency for Public Mobilization and Statistics (CAPMAS), the Food and Agriculture Organization of the United Nations (FAO), and the Central Administration for Agricultural Economics of the Ministry of Agriculture and Land Reclamation, Egypt.

2.2 Objective of study

This study targets the competitive analysis of Egypt's exports in global markets of rice from 2000 to 2020 and stands on factors affecting them for policy proposals that would improve the competitive center of Egypt in export markets of rice crops.

2.3 Econometrics Models and Data Analysis

In terms of methodology and data sources, the study relies on descriptive and quantitative analysis using mathematical and statistical techniques, as well as the use of economic measures such as the revealed comparative

advantage, price competitiveness, the rate of penetration, non-stability coefficient, the export power, and market share.

3. RESULTS AND DISCUSSION

3.1 The production and Global trade of the Egyptian rice

3.1.1 Cultivated Area

The average of cultivated rice area in the Arab Republic of Egypt accounted for about 590.3 thousand hectares during the period of 2000-2020, with a minimum value of around 361.1 thousand hectares in 2018 and a maximum amount of 745.1 thousand hectares in 2008. This means that the cultivated area increased by (26.22% and 106.34%)* over the average period and the minimum period, respectively (Table 1, Fig 1).

*Where it as calculated:

1. $The\ increase\ rate\ over\ the\ maximum = \frac{maximum - Average}{Average} \times 100$
2. $The\ increase\ rate\ over\ the\ minimum = \frac{maximum - minimum}{minimum} \times 100$

Table 1: Survey of cultivated area, total production and yield of Egyptian rice crop during 2000-2020			
Year	Cultivated Area (1000 ha)	Total Production (1000 tons)	Yield (hg/ha)*
2000	659.2	6000.5	91025
2001	563.0	5226.7	92833
2002	650.3	6105.5	93889
2003	633.6	6176.3	97484
2004	645.7	6352.4	98384
2005	613.3	6125.3	99874
2006	670.5	6755.0	100750
2007	704.1	6876.8	97675
2008	745.1	7253.4	97349
2009	575.5	5520.5	95930
2010	459.5	4329.5	94217
2011	593.2	5675.0	95670
2012	620.3	5911.1	95296
2013	597.1	5724.1	95865
2014	573.7	5467.4	95300
2015	510.9	4818.0	94312
2016	568.7	5308.9	93353
2017	549.7	4960.7	90245
2018	361.1	3123.7	86511
2019	548.5	4804.3	87582
2020	554.2	4893.5	88298
Average	590.3	5591	94017.8

*Note (hg/ha) = hectogram per hectare, whereas one ton =10000 hectogram

Source: www.fao.org/faostat

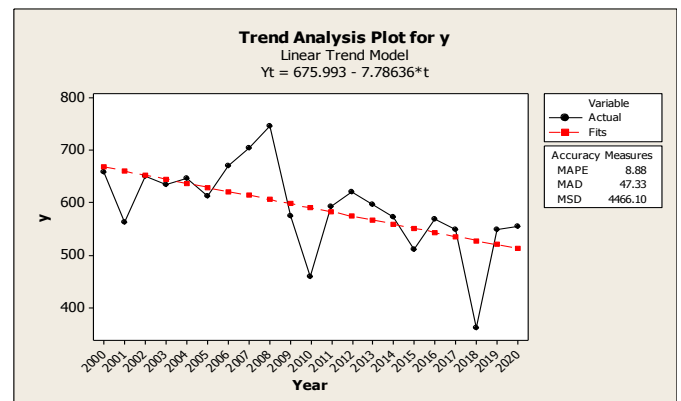


Figure 1: The changes in the total cultivated rice area in Egypt during 2000-2020

Source: 1- Ministry of Agriculture and Land Reclamation, the Central Administration for Agricultural Economics, Statistics Dept. Records, Unpublished Data.2-www.fao.org/faostat

By estimating the Regression Analysis equation of the total cultivated area of rice crop in Egypt, it was clear that the cultivated area of rice crop took a decreasing trend during the study period (Fig 1); however, the significance of this decrease was statistically significant. The annual decrease amounted to about 7.79 thousand hectares with an annual

decrease of about 1.32% of the average cultivated area from rice crop. The value of R-Sq(adj) is the responsibility of the factors reflected by the time element for about 29.7% of the changes in the cultivated area of the rice crop in Egypt during the study period. Therefore, the shortage of the rice cultivated area at the end of the study period is due to the state taking measures to reduce rice cultivation, such as imposing fines on those who violate the specified areas for rice cultivation as well as the decrease in farm prices in previous years (Table. 2).

Table 2: Regression Analysis equations of rice variables during the period 2000-2020							
Variables	The Regression equation	Minimum	Maximum	Mean	Std. Deviation	R-Sq(adj)	F
Cultivated Area (1000 ha)	$Y^{\wedge} = 675.99 - 7.79 x$ (-3.8)**	361.1 (2018)	745.1 (2008)	590.3	84	29.7	9.46 **
Total Production (1000 tons)	$Y^{\wedge} = 6607.62 - 92.4 x$ (-3.38)**	3124 (2018)	7253 (2008)	5591	937	34.2	11.39 **
Yield (kg/ha)	$Y^{\wedge} = 98285.1 - 355.608x$ (-3.01)**	86511(2018)	100750 (2006)	94373	3881	28.8	9.07 **

Source: 1- Ministry of Agriculture and Land Reclamation, the Central Administration for Agricultural Economics, Statistics Dept. Records, Unpublished Data.

2-www.fao.org/faostat

3.1.2 The total production of rice during the study period

The average total production of rice crop in Egypt during the study period accounted for about 5591 thousand tons, with a maximum value of about

7253 thousand tones in 2008, and a minimum amount of about 3124 thousand tones in 2018, an increase of 29.73% over the average and 132.17% above the minimum. Furthermore, the total production of rice took a decreasing trend during the study period (92.4 thousand tons), with an annual decrease of 1.65%; however, the significance of this decrease was statistically significant. The value of R-Sq(adj) is the responsibility of the factors reflected by the time element for about 34.2% of the changes in the total production of rice crop in Egypt during the study period (Table 2, Fig 2).

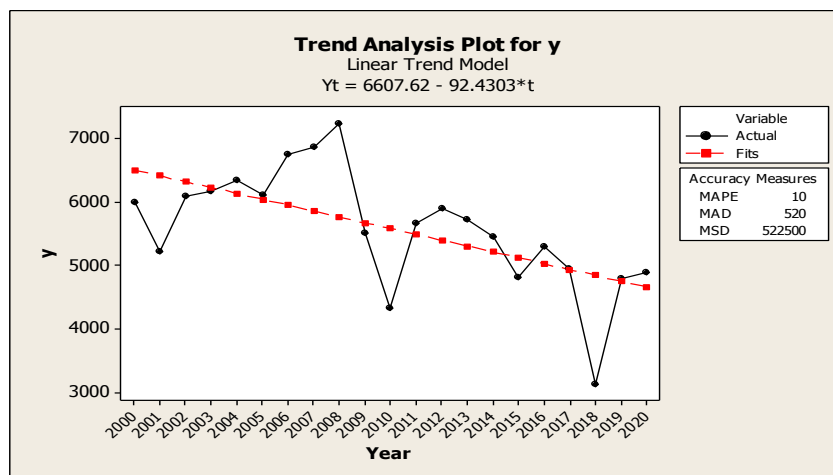


Figure 2: Trend of Egyptian rice production during 2000-2020

3.1.3 The hectare yield of the rice crop in Egypt.

The data in Table (1) indicates that the average productivity of hectare from rice crop in Egypt during the period 2000-2020 was estimated at

about 94373hg/ha, with a minimum value of about 86511 hg/ha in 2018, and a maximum yield of about 100750 hg/ha in 2006.

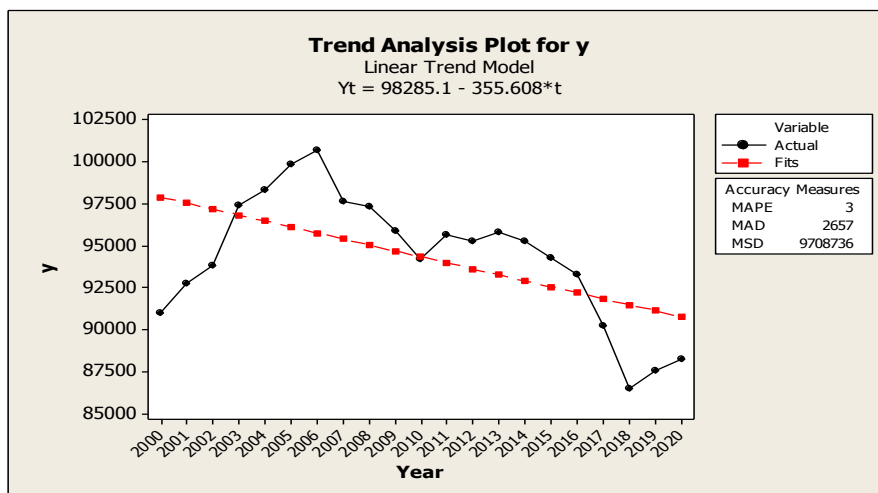


Figure 3: Hectare productivity of Egyptian rice during 2000-2020

Source: Data from Table (1)

By estimating the Regression Analysis equation of the hectare productivity of the rice crop in Egypt during the same period, it was found that the hectare's productivity took a decreasing trend (Fig 3) and statistically significant. Where the annual decrease in productivity was about 356 hg/ha. The value of the R-Sq(adj) the responsibility of the factors reflected by the time element for about 28.8% of the changes in the productivity of the production from rice crop in Egypt during the study period (Table 2).

3.2 Distribution of Egyptian Rice Exports

Egypt exports rice to many different countries around the world. The collected data revealed that Egyptian rice exports are concentrated in eleven countries: Syria, Turkey, Lebanon, Sudan, Libya, Saudi Arabia, Jordan, Romania, Belgium, the United Kingdom, and Ukraine. Over the studied period, some of these importing countries import rice regularly and the other ones import rice, unregularly. In general, Egypt occupied a good position among the rice-exporting countries around the world until 2015, but unfortunately, the amount of rice exports decreased during the last years. The total Egyptian rice exports accounted for approximately 45.75% for the Arab countries and 28.90% for the European countries during the study period.

The remaining amounts were distributed in the others countries. Regarding Arab countries, Syria is the first Arab destination market for Egyptian rice exports, with total amount of rice exports reaching 1679.93 thousand tons during the period of 2000-2020, which represented about 19.29% of the total Egyptian exports from rice during the same period. The market value total of this amount of exported rice reached 680354 thousand USD during that time (about 20.67% of the market value of the Egyptian rice exports).

Libya and Jordan come in the second and third position, with total amount of 783.08 and 542.74 thousand tons, respectively, which representing about 8.99 and 6.23% from the total of Egyptian exports of rice crop during the study period 2000-2020. The total market value of this rice amount was about 314413, 168597 thousand USD, which represents about 9.55%, 5.12% of the total value of Egyptian rice exports during the study period.

Sudan, Saudi Arabia, and Lebanon, come after with total Egyptian rice imports reached 482.85 (5.55%), 269.82 (3.1%), and 225.82(2.59%) thousand tons, respectively, with total market values of 116422 (3.54%),

3.3.1 The Revealed comparative advantages of Egyptian rice exports

Years	Value of world exports (million dollars)		Value of Egyptian exports (million dollars)		The revealed comparative advantage
	Rice	Agricultural	Rice	Agricultural	
2000	6499.33	403325.9	112.57	491.9	14.20
2001	7010.32	406910.8	133.85	602.0	12.91
2002	6691.08	434787.6	105.55	751.8	9.12
2003	7163.51	516232.4	149.93	914.6	11.81
2004	8954.45	596159.8	232.16	1278.7	12.09
2005	9612.77	641670.6	311.03	1139.2	18.22
2006	10593.46	708198.5	302.13	1072.6	18.83
2007	13748.86	859004.8	402.61	1544.1	16.29
2008	20236.40	1049041.3	191.11	2135.7	4.64
2009	19305.83	935807.6	475.93	4291.5	5.38
2010	20143.43	1065445.7	377.85	2890.4	6.91
2011	23985.45	1295510.0	17.10	4932.3	0.19
2012	23680.44	1310381.7	98.50	3899.6	1.40
2013	24060.34	1365267.2	199.32	4714.3	2.40
2014	26426.81	1421471.7	29.86	4395.8	0.37
2015	23191.67	1274889.5	77.00	4378.1	0.97
2016	20825.53	1287439.8	24.30	4354.9	0.34
2017	24685.37	1411311.4	12.00	4921.5	0.14
2018	26178.00	1454196.9	20.80	5013.7	0.23
2019	24082.13	1444359.2	18.25	5450.9	0.20
2020	25687.35	1492211.1	0.004	5169.8	0.00004
Average	17750.60	1017791.60	156.75	3063.97	6.51

Source: www.fao.org/faostat

109861(3.34%), and 98478 (2.99%) thousand USD, respectively during the period 2000-2020.

Regarding to the European countries, Turkey comes in the first order of importing Egyptian rice, with a Total approximately 1062.11 thousand tons, (12.2% of the Total of Egyptian rice exports) during period 2000-2020. The Total marketing value of this amount was accounted about 371070 thousand USD (11.27 % of the Total marketing value of Egyptian rice exports).

Romania ranks the second European countries that importing Egyptian rice (461.85 thousand tons about 5.3% of Total Egyptian rice exports). At the same period, the Total value of the imported Egyptian rice by Romania was about 110073 thousand USD (3.34% of the Total value of Egyptian rice exports).

Belgium was ranked as the third European country that importing of the Egyptian rice with an Total amount of about 458.82 thousand tons (5.27% of Total of Egyptian rice exports), which equal of 145939 thousand USD (4.43% of Total value of the Egyptian exports from rice).

The fourth and fifth order was occupied by the United Kingdom and Ukraine, respectively. Where the amount of their exports reached about 279.75 and 252.69 thousand tons, (3.21 and 2.9 % of Total of Egyptian rice exports) during the period. These values represents 85265 and 74579 thousand USD (2.59 and 2.27% of the Total value of Egyptian rice exports during 2000-2020).

In general, the European countries that importing the Egyptian rice were ranked in the descending order of Turkey, Romany, Belgium, the United Kingdom, and Ukraine. The total amount of what the aforementioned eleven countries import of Egyptian rice represents about 74.63% of the total international imports of Egyptian rice during that period, and about 69.11% of the total value of Egyptian rice exports.

3.3 Export performance indicators of Egyptian rice

This part concentrates on some export performance indicators of Egyptian rice such as the non-stability coefficient, the competitive price position, market share, and market penetration indicators.

The revealed comparative advantage is measured by dividing the proportion of the export value of a country to a given product from the total export value of that country on the proportion of the global exports value of that product from the total value of exports of global goods (Tarek, 2010).

A country has much production inputs, the country has much comparative advantage in producing a particular product. Due to the international differences in cost, the principle of comparative advantage and its extension to that comparative advantage will raise (Mzumara, 2006). The revealed comparative advantage factor determines the competitive advantage of exports of a commodity and its potential future prospects through the proportion of the country's share of world exports of the commodity in question to the share of world exports of that commodity from world agricultural exports. Natural resources (e.g., water, land, and crop species) and labor are the main sources of comparative advantage factors. The comparative advantage is calculated from the following equation:

$$RCA_{ji} = [VC_{ji} / VCA_i] / [VW_{ji} / VW_{Ai}] \quad (1)$$

Where:-

RCA_{ji} = the revealed comparative advantage of a crop (j) per year (i)

VC_{ji} = the value of a country exports of a crop (j) to world in year (i)

VCA_i = the value of agricultural exports of the country to the world per year (i)

VW_{ji} = the value of world exports of commodity (j) per year (i)

VW_{Ai} = the value of world agricultural exports per year (i)

If the value of the comparative advantage coefficient is greater than one, the country under consideration has a revealed comparative advantage for that commodity, but if the coefficient is less than one, there is no comparative advantage for that commodity (Balassa, 1965, Krugell and Matthee, 2009). According to the RCA remains valid in revealing true comparative advantage (Deardorff, 2010).

The comparative advantage coefficient of the Egyptian rice exports during the period of (2000-2020) was irregularly decreased (Table 3). This means that Egyptian rice exports are losing their comparative advantage in world markets. This results because of the governmental decisions that reduced the planted area of rice crops, particularly after the relative decrease of water resources. Where the average period was about (6.51) with a minimum of about (0.0000400) in 2020 and a maximum of about (18.83) in 2006.

Based on the average, the comparative advantage coefficient during the period (2000-2020), on the most important countries producing rice

around the world was 30.47, 14.78, 12.49, 11.22, 10.62 and 9.19 for Pakistan, Viet Nam, Cambodia, India, , Thailand, and Myanmar respectively, during the average period.

While Egypt comes in the Seventh place with average comparative advantage coefficient of 6.51, which means that there is an apparent comparative advantage for Egyptian rice exports in world markets, followed by Japan, China, USA, Bangladesh, Brazil, Philippines, and Indonesia (Table (2) Annex).

3.3.2 Prices Competitiveness of Egyptian Rice Exports and The Competing Countries

The export price is an important parameter to determine the price competitiveness of Egyptian rice in the international markets because each country seeks to reduce the prices of its exports to attract as many importing markets as possible thought reducing production, marketing and manufacturing costs, supporting the export price, customs exemption and other policies. The lower the export price of a product (compared to its counterparts in other competing countries) means there is a price advantage for exported such product and better competitiveness (Neveen, 2013).

- The price competitiveness of rice is calculated by the following equation:

$$PC = Pe_{ji} / Pc_{ji} \quad (2)$$

Whereas: **PC** = the price competitiveness

Pe_{ji} = the average price export of rice (j) per a year (i) for Egypt.

Pc_{ji} = the average price export of rice (j) per a year (i) for the competing country.

If the above ratio given value less than one, it means there is a competitive advantage for the state in exporting the Egyptian rice in comparison to the competing countries, and vice versa (Omar, 2016). The low price ratio means that the average Egyptian export price is less than the average export price of the competing country. This means that there is a competitive price advantage for Egypt in exporting the commodity compared to the competing countries, and vice versa.

The price competitiveness was calculated as an average price export of Egyptian rice in comparing with the main competing countries (Thailand, China, USA, India, Italy, and Pakistan). As shown in Tables (4), the average Egyptian price export of rice (436.73USD/ ton) during 2000-2020 was less than the counterparts of Thailand China, USA, India, and Italy. It was represented about 99%,97%, 85%, 82% 57%of the average export price of these countries, respectively (i.e. Egypt has a competitive price compared to these competing countries).

Table 4: Relative prices of Egyptian rice exports and the competing countries during 2000-2020

Year	Egypt/Pakistan	Egypt/Thailand	Egypt/China	Egypt/USA	Egypt/India	Egypt/Italy
2000	1.08	1.07	1.51	0.92	0.67	0.61
2001	0.95	0.99	1.16	0.73	0.63	0.44
2002	0.83	1.02	1.19	0.94	0.95	0.48
2003	0.83	1.17	1.33	0.93	0.97	0.44
2004	0.81	1.03	1.04	0.72	0.90	0.48
2005	0.87	0.90	0.81	0.82	0.81	0.53
2006	0.99	0.88	0.91	0.78	0.94	0.50
2007	0.92	0.87	0.89	0.70	0.75	0.44
2008	1.04	1.04	1.21	0.92	0.60	0.60
2009	1.07	1.25	1.06	0.98	0.68	0.71
2010	1.22	1.06	0.90	1.00	0.61	0.78
2011	0.71	0.70	0.49	0.65	0.52	0.45
2012	1.22	0.97	0.65	1.05	1.15	0.79
2013	1.07	0.91	0.63	0.87	0.82	0.66
2014	0.62	0.73	0.38	0.53	0.51	0.38
2015	1.19	1.22	0.59	0.93	0.97	0.65
2016	1.12	1.09	0.61	0.88	0.90	0.56
2017	0.91	0.90	0.77	0.76	0.68	0.49
2018	1.36	1.37	1.58	1.11	1.09	0.79
2019	0.76	0.70	0.96	0.62	0.54	0.42
2020	1.25	1.02	1.60	0.99	1.21	0.70
Average	1.00	0.99	0.97	0.85	0.80	0.57

Source: www.fao.org/faostat

On the other hand, the Egyptian price of export of rice reached 99% of the Thailand equivalent in the first place in the price competition as an average for that period. Where The ratio The price ranged between Egyptian and Thailand rice between a Maximum of about 137% in 2018 and a minimum of about 70% in 2019, China ranked second in the competition as the Egyptian export price of rice reached 97% of the average China export price for that period. The price ratio between Egyptian and China rice ranged between a Maximum of about 160% in 2020 and a minimum of about 38% in 2014. USA ranked third in export for that period. The price ratio between Egypt and USA rice ranged between a Maximum of about 111% in 2018 and a minimum of about 53% in 2014. India ranked fourth in export for that period. The price ratio between Egyptian and India rice ranged between a Maximum of about 121% in 2020 and a minimum of about 51% in 2014 Italy coming in Fifth rank in export for that period. The price ratio between Egyptian and Italy rice ranged between a Maximum of about 79% in 2018 and a minimum of about 38% in 2014. While the export price for the Egyptian rice is equivalent with the export price of the Pakistani rice during the average period 2000-2020, with a maximum limit of about 136 % in 2018, and a minimum limit of about 70 % in 2019.

3.3.3 Market penetration rate of Egyptian rice exports to the most important markets of the importing countries

The market penetration rate is an essential indicator for measuring the market performance of a country for a particular commodity. It represents a measure of the marketability of markets to import Egyptian rice. The most important markets for Egyptian rice during the period (2000-2020).

The market penetration rate was calculated as follows: (Georgi, 2002).

$$MPR_{ij} = M_{ijk} / (Q_{ij} + M_{ij}) - X_{ij} \tag{3}$$

Where:

MPR_{ij} = the penetration rate of the commodity (j) for the country market (i)

M_{ijk} = the imports of the country (i) of a commodity (j) from exporting country (k)

Q_{ij} = Country Production (i) of the commodity (j)

M_{ij} = the total imports of the country (i) of the product (j)

X_{ij} = the Country exports (i) of the commodity (j).

The market penetration coefficient of Egyptian rice was calculated for the main imported markets to identify the extent of penetration of these commodities to those markets.

Table (5) shows the penetration coefficient of Egyptian rice for the most important Arab and European markets. There are markets that had high penetration coefficients, and other markets had a low coefficient of penetration of Egyptian rice, which means that the difficulty of the ability of those markets to absorb Egyptian rice is a result of intense competition. However, these results mean that Egyptian rice exports to these countries can increase if appropriate efforts it made to study these markets and identify their needs.

When calculating the penetration rates of Egyptian rice in the most important markets of the countries that import Egyptian rice during the period (2000-2020), we can conclude that the Sudanese market ranked first with a penetration rate of about 32.52% as an average for the period, followed in second place by Syrian market with an average penetration rate of about 31.08%. The Libya market had a penetration rate of about 28.43% and came in third place. Followed by the Romanian market in the fourth place with a penetration rate of about 24.97%, then the Lebanese market in the fifth place with a penetration rate of about 20.17%, while the markets of the countries took Jordan. Belgium, Ukraine, Turkey, the UK, and Saudi Arabia countries took ranking from sixth to 11th with penetration rates of 17.92%, 11.25%, 5.98%, 5.89%, 2.11%, and 1.25%, respectively.

This indicates that both Sudan markets, Syria, Libya, Romania, Lebanon, Jordan, and Belgium are considered promising markets, which can import Egyptian rice in large quantities in the future. Therefore, the State must pay attention to improving trade relations between them and those countries to increase exports and penetrate their markets.

Table 5: The penetration rates of the Egyptian rice markets during 2000-2020

Year	Sudan	Syrian	Libya	Romania	Lebanon	Jordan	Belgium	Ukraine	Turkey	U K	Saudi Arabia
2000	69.55	66.26	54.65	47.79	19.00	10.74	0.69	0.45	9.3	0.17	1.05
2001	71.54	55.83	40.84	88.36	33.64	22.40	6.79	32.86	16.6	2.87	1.64
2002	82.36	47.68	34.93	80.14	28.28	49.94	6.41	11.94	11.3	3.34	1.95
2003	63.23	62.17	67.32	65.19	44.04	31.82	11.05	2.10	17.5	2.91	1.85
2004	56.29	85.52	31.13	65.70	55.52	37.44	7.06	17.81	13.2	4.97	3.56
2005	73.23	101.78	78.83	82.67	66.52	39.63	11.97	24.98	14.3	3.26	3.71
2006	37.70	76.22	67.59	43.81	36.35	85.71	17.77	18.41	14.1	4.49	2.39
2007	59.97	72.30	96.89	41.65	53.48	75.01	36.21	10.95	18.6	3.62	6.58
2008	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0	0.00	0.00
2009	42.55	64.20	80.46	3.63	32.01	23.68	24.64	5.54	7.5	2.55	2.53
2010	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0	0.00	0.00
2011	0.00	0.0004	0.34	0.00	0.00	0.00	15.40	0.00	0.0	2.37	0.01
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0	0.00	0.00
2013	8.91	20.62	44.06	2.11	54.37	0.00	49.75	0.05	1.2	2.57	0.99
2014	0.00	0.00	0.00	0.36	0.07	0.00	26.73	0.00	0.1	3.60	0.00
2015	117.56	0.00	0.00	1.44	0.18	0.00	13.61	0.41	0.0	4.21	0.00
2016	0.00	0.00	0.00	1.60	0.07	0.00	8.16	0.00	0.0	3.34	0.03
2017	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0	0.00	0.00
2018	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0	0.00	0.00
2019	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0	0.00	0.00
2020	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.004	0.0	0.00	0.00
Average	32.52	31.08	28.43	24.97	20.17	17.92	11.25	5.98	5.89	2.11	1.25

Source: www.fao.org/faostat

3.3.4 Non-stability coefficient Non-stability in Quantity, price, and value of Egyptian rice

The export quantity stability criterion demonstrates the degree to which export requirements are met. It is also evidence of the preservation of foreign markets for Egyptian exports from rice crop, its continuation and

the importers in the exporting countries do not shift to the markets of competitive countries, are more able to meet export requirements. The ability of states to fulfill the export requirements is measured through the stability of the quantity of exports and price stability is also an incentive for rice producers. The average percentage deviation method was used to calculate the Non-stability coefficient according to the following equation:

$$s_t = \frac{|y_t - \hat{y}_t|}{\hat{y}_t} \times 100 \quad (4)$$

Where: S_t = non-stability coefficient for quantity, value, and price.

Y_t = the actual value of the studied variable.

\hat{Y}_t = The estimated value of the studied variable.

The geometric mean of this ratio expresses the coefficient of non-stability. If the value of this coefficient is equal to zero, it means the stability or constancy of the calculated phenomenon. The higher the value of this parameter, the greater the degree of instability (Al-Danasouri, 2005 & Tarek, 2010).

3.3.4.1 The quantitative stability of Egyptian rice

The quantitative non-stability coefficient of rice crop as an average the period (2000-2020) was estimated by 55.0%, the minimum of coefficient was observed in 2013 and accounted of 7.51%. This indicated that there was almost relative stability in this year. Whereas the maximum was showed in 2007, and estimated by 120%, which indicated an increase in

the index of instability, due to a large increase over the average period (Table 6).

3.3.4.2 The price stability of Egyptian rice

During the study period, the non-stability coefficient during the study period for price was estimated at 25.0% (Table 6), which indicating that there is relative price stability. The minimum during that period was about 5.49% in 2015, indicating that there is high relative stability in that year, and the maximum was reached in 2009. Where it estimated at 70.63%, indicating an increase in the index of instability, due to a large increase over the average.

3.3.4.3 The value stability of Egyptian rice

Table (6) shows that the average of value non-stability coefficient during the study period was estimated by 67.2%, the minimum during that period was about 3.86% in 2004, indicating that there is relative stability in that year, and the maximum was reached in 2009. Where it estimated by 183.49%, indicating an increase in the index of instability, due to a large increase over the average.

Table 6: Evaluation of the non-stability coefficients for quantities, values and prices of Egyptian rice exports during 2000 - 2020

Years	Actual value of rice			Non-stability coefficient		
	Quantity (thousand ton)	Value (Million dollar)	Price (USD/Ton)	Quantity (thousand ton)	Values (Million dollar)	Price (USD/Ton)
2000	393.0	112.57	286.4	52.96	58.00	5.72
2001	656.2	133.85	204.0	17.48	47.90	29.31
2002	464.4	105.55	227.3	38.48	57.06	25.78
2003	585.7	149.93	256.0	18.05	36.11	20.97
2004	836.5	232.16	277.5	24.03	3.86	18.77
2005	1111.5	311.03	279.8	75.25	46.43	22.13
2006	982.8	302.13	307.4	65.46	50.11	18.46
2007	1223.3	402.61	329.1	120.91	111.74	16.61
2008	306.8	191.11	622.8	40.26	6.76	51.05
2009	648.7	475.93	733.7	37.06	183.49	70.63
2010	599.7	377.85	630.0	38.48	141.04	40.73
2011	40.0	17.10	427.8	89.82	88.26	8.07
2012	146.9	98.50	670.7	58.34	26.76	38.85
2013	335.8	199.32	593.6	7.51	61.57	18.55
2014	82.0	29.86	364.2	69.87	73.40	29.74
2015	136.2	77.00	565.5	41.26	23.84	5.49
2016	50.1	24.30	485.0	73.86	72.99	12.41
2017	30.0	12.00	400.0	80.19	84.78	30.00
2018	30.0	20.80	693.3	73.02	69.28	17.69
2019	48.0	18.25	380.4	32.35	67.75	37.31
2020	0.01	0.004	666.7	99.97	99.99	6.77
Average	414.6	156.8	447.7	55.0	67.2	25.0

Source: www.fao.org/faostat

3.3.5 The power of Egyptian rice exports

To determine the country ability to export rice crop and keeping its position in the global market via estimate the ratio between the quantity of Egyptian rice exports and the quantity of domestic production (National Planning Institute 2001).

The exports power expresses the status of the country in the export of a commodity. The export ratio was calculated according to the following equation:

$$EP = QEC / ALP * 100 \quad (5)$$

Where:

EP= export power.

QEC= the exports quantity of country for commodity.

ALP= the local production amount of country for commodity.

Table (7) shows that the export power (EP) of Egyptian rice crop during 2000-2020. The high value of EP means the country has more power to export the commodity. The EP was estimated about 10.46% for the domestic production and decreased by annually rate of 1.05%. The minimum EP was 0.0002% in 2020, whereas the maximum once was 27.21% for domestic production in 2005. Therefore, Egypt gradually lost the EP due to decrease the local production of rice resulting from the relative water scarcity.

3.3.6 Market share indicator of Egyptian rice

The market share index (MSI) was used to measure the level of commodity competitiveness. It shows the ability of commodity to meet the exporting requirements and the efficiency of marketing processes. Whenever the value of MSI is higher than "one" that means the country has the MSI in foreign markets. The MSI was calculated as follows:

$$MSI = QE / TIC \quad (6)$$

Where:

MSI = Market share indicator.

QE = the quantity of Egyptian exports to a country of a commodity.

TIC = Total imports of the importing country from the same commodity.

The MSI of Egyptian rice during 2000-2020 is shown in Table (7). It was estimated about 1.43% of the world rice imports. The minimum value of MSI was 0.00001% in 2020, while, the maximum was 3.99% of world imports in 2005. This may be due to the decrease of cultivated area, which led to decreasing in the total production of rice, and decrease the number of Egyptian rice exports. These results are in harmony with those obtained by (Al-Shater, Kamel, 2013).

Table 7: Relative comparative advantage, export power, and market shares of Egyptian rice crop during 2000-2020			
Year	Revealed Comparative Advantage	Export power	Market shares
2000	13.74	9.82	1.75
2001	12.76	18.82	2.79
2002	9.05	11.40	1.75
2003	11.73	14.22	2.16
2004	11.99	19.74	3.04
2005	18.12	27.21	3.99
2006	18.95	21.81	3.33
2007	16.37	26.67	3.89
2008	4.63	6.34	0.99
2009	5.32	17.62	2.21
2010	6.98	20.77	1.88
2011	0.18	1.06	0.11
2012	1.35	3.73	0.39
2013	2.38	8.79	0.89
2014	0.37	2.25	0.21
2015	0.97	4.24	0.33
2016	0.34	1.42	0.13
2017	0.14	0.91	0.07
2018	0.23	1.44	0.06
2019	0.20	1.50	0.11
2020	0.00004	0.0002	0.00001
Average	6.5	10.46	1.43

Source: www.fao.org/faostat

4. CONCLUSION AND RECOMMENDATIONS

The rice crop comes at the forefront of the main strategic and food crops in Egypt, due to the dependence of many consumers on their various economic and social levels as an energy source, as it represents the basic food for the Egyptian citizen (Abo-Zaid and Mansour, 2017). This study aims to evaluate the current situation of Egyptian rice exports and their competitive position in the world market. The study analyzed the performance of Egyptian rice exports by analyzing the revealed comparative advantage (RCA_{ij}), price competitiveness (PC), market penetration rate (MPR_{ij}), non-stability index (St), market share indices (MSI), and the export power (EP) of Egyptian rice exports during 2000-2020.

The results showed that the revealed comparative advantage of Egyptian rice exports irregularly decreased during the study it reached about 6.51 as an average during the study period. The average price competitiveness of Egyptian rice exports (436.73 USD/ton) was less than the counterparts of Thailand, Pakistan, China, the USA, India, and Italy. The first market for Egyptian rice was the Sudanese market with a market penetration rate of about 32.52% (an average for the whole studied period), followed by Syrian (31.08%) and Libyan markets (28.43%). The study showed that indicates that both Sudan markets, Syria, Libya, Romania, Lebanon, Jordan, and Belgium are considered promising markets, which can import Egyptian rice in large quantities in the future. Therefore, the State must

pay attention to improving trade relations between them and those countries to increase exports and penetrate their markets. The quantitative, price and value non-stability coefficient of rice (as average) was estimated at 55, 25, and 67.2%, respectively. The export power of Egyptian rice was estimated at about 10.46% for domestic production and annually decreased by a rate of 1.05% during the study period. Therefore, Egypt gradually lost the export power of Egyptian rice due to a decrease in the local production of rice resulting from the paucity of water Sources. The study recommends that Egypt should pay attention to the trade relations between it and these countries and increase exports and penetrate their markets. Encouragement of farmers to increase and improve rice production is an economic demand for rising rice export. Reducing the production requirements and exports fee should be considered to offer profit for farmers. The government must make decisions that encourage farmers to increase rice production in preparation for increasing export from it. The study recommends production requirements must be provided at reduced prices to give profit to farmers. Striving to lower Egyptian rice export prices in markets that can be penetrated so as to raise Egypt's competitiveness in these markets By supporting the government for farm prices, contributing to the Convergence between farm prices and border prices, and focusing on increasing the volume of exports to Sudan, Roman, Syria, Libya, and Jordan markets since these are the market to which Egypt can expand in rice exports

REFERENCES

- Abd El-Fatah, S. M., 2009. Competitive of the Egyptian Potatoes Exports in the British Market", Vol. 19, No. 4, pp. 1373-1382. Published by the Egyptian Association of Agricultural Economics, Agriculturalists Club, Giza, Egypt.
- Abo-Zaid, M. El., Attia, Mansour, A., Fatma, 2017. The Economic Impacts of the Price Policies Case Study (Rice in Egypt), J. Agric. Econom. And Social Sci., Mansoura Univ., Vol. 8(5) Pp. 281-285.
- Ahmed, R.H., 2006. Competitiveness of Egyptian Rice and Onion Crop in Some EU Markets, Egyptian Journal of Agricultural Economics, Volume 16, Issue 3, September, Egypt.
- Al-Danasouri, F.M., 2005. The Competitiveness of the Most Important Egyptian Export Crops for COMESA, The Egyptian Society for Agricultural Economics, The Egyptian Journal of Agricultural Economics, Vol. 10, First Issue, March, Egypt.
- Al-Shater, A.A., Kamel, A., 2013. Economic Study of Egyptian Exports Flax, Egyptian Journal of Agricultural Economics, Vol. 23, No. 4, Pp.122-125.
- APMAS, 2016. Foreign Trade Database, Foreign, Trade Bulletins, Govt. Egypt., Cairo. Arab Organization for Agricultural Development, Statistical Yearbook, Different Issues. Central Agency for Public Mobilization and Statistics, Foreign Trade Bulletins, Different Issues.
- Balassa, B., 1965. Trade Liberalisation and Revealed Comparative Advantage. Newhaven: Yale University, Economic Growth Centre.
- Concepción, C., 2006. Rice International Commodity Profile, Food and Agriculture Organization of the United Nations Markets and Trade Division Pp.1-23.
- Deardorff, A. V., Stern, R. M., 2002. What You Should Know About Globalization and the World Trade Organization. Review of International Economics, 10(3), Pp. 404-423.
- El-Motaleb, E.A., 2002. the Competitiveness of Some Agricultural Commodities in Foreign Markets, the Second Conference of the Agricultural Economics Research Institute, Egypt.
- El-Santresy, T.M.A., 2006. An economic study of the impact of some local and foreign variables on the production and exports of Egyptian potatoes, Master thesis, faculty of agriculture, Ain Shams University, Egypt, Pp. 45-48.
- Fadel Ali Muthanna, 2000. The Possible Effects of the World Trade Organization on International Trade for the Developing Countries. Library MedBoli, Cairo.
- Frei, M., Becker, K., 2004. On rice, biodiversity and nutrients. Institute of Animal Production in the Tropics and Subtropics. University of Hohenheim, Stuttgart.

- Georgi .M.F., 2002. An Economic study of some non-traditional export crops with emphasis on production potential in Assiut Governorate, *PhD Thesis, Department of Agricultural Economics, Faculty of Agriculture, Assiut University, Egypt.*
- Goldin, I.C., 1990. Comparative advantage: The theory and application to developing country agriculture. OECD Development Centre. Working Pp. 16.
- Hassan, A. A., mohamed, A. A., Elgebaly, M. R., Hassan, H., and et al., 2010. Economic Analysis of the Current Situation for the Production, Export and the Competitiveness of Egyptian Oranges in Global Markets", *Australian Journal of Basic and Applied Sciences*, Vol. 4, No. 12, pp. 5797-5804.
- Hassan, M. B. E., El-Agrody, N. M., Mohamed, K. A., 2009. An economic study of Egyptian rice competitive position in foreign markets. *Australian Journal of Basic and Applied Sciences*, 3(2), Pp. 810-819.
- Hassan.M.B., 2009. An Economic Study of Egyptian Rice Competitive Position In Foreign Markets , *Australian Journal of Basic and Applied Sciences*, 3(2): 810-819, 2009 , ISSN. Pp. 1991-8178.
- Hoekman, B., 2004. The WTO: Functions and Basic Principles. The World Trade Organization, Pp.4149.<http://dx.doi.org/10.1080/03768350903086838>.<http://www.fao.org>.
- Institute of National Planning, 2001. Comparative Advantage and Protection Rates for Some Major Agricultural and Industrial Commodities, Series of Planning and Development Issues, No. 142, January 2001, Egypt).
- Ismail, T.H., 2003. Agricultural marketing, reference paper presented to the Standing Scientific Committee for Agricultural Economics, and guidance. And Rural Society, Egypt.
- Krugell, W., Matthee, M., 2009. Measuring the Export Capability of South African Regions. *Development Southern Africa*, 26(3), Pp. 459-476.
- Mansour, M.S., 1996. An Economic Study of Egyptian Rice Exports, the *Egyptian Magazine for Agricultural Economics*, 6(2)
- Ministry of Agriculture and Land Reclamation, 2019. The Central Administration for Agricultural Economics, Statistical Dept. Records, Unpublished Data.
- Mohamed. S.A., 2017. An Economic study of the production and consumption of bean crop in Egypt and its foreign trade , Master Thesis, Department of Agricultural Economics, Faculty of Agriculture, Assiut University, Pp. 12, Egypt.
- Muthanna, F.A., 2000. The Possible Effects of the World Trade Organization on International Trade for the Developing Countries. Library MedBoli, Cairo.
- Mzumara, M., 2006. The Theory of Money and Banking in Modern Times. Mustang: Tate Publishing LCC.
- Neveen, M., Torayeh, 2013. The competitiveness of the Egyptian agricultural exports in the E U market. Should Egypt diversify its trade pattern? *Applied Econometrics and International Development* Vol. 13-2 (2013), Pp. 137-156.
- Omar M.E., 2016. Economic Study to Increase the Competitiveness of Egypt's Exports of Crops", Al-Basal, Ph.D., Department of Agricultural Economics, Faculty of Agriculture, University of Almania, Egypt.
- Qadri, A., 2001. External Trade of Main Cereal Crops and Food Security in Egypt, the *Egyptian Magazine for Agricultural Economics*, 11(1).
- Serin, Vildan, Civan, Abdulkadir, 2008. Revealed Comparative Advantage and Competitiveness: A Case Study for Turkey towards the EU. *Journal of Economic and Social Research* 10(2) 2008, Pp. 25-41.
- Shams, S.E, Abo El-Ela, A.M., 2002. Analyzing the Estimated Demand for Egyptian Rice Exports, the *Egyptian Magazine for Agricultural Economics*, 11(2).
- Sumithra, M., Jonathan. D., Scott, M., Glen, F. M., 2014. An overview of global rice production, supply, trade, and consumption, *Ann. N.Y. Acad. Sci.* ISSN 0077-8923. Pp1-8.
- Tarek. A. A., 2010. The Impact of Agricultural Policy on the Production and Consumption of Some Medicinal and Aromatic Plants in Egypt", *Alexandria Journal of Agricultural Research, Agricultural Development Strategy and Challenges of Food Security Conference, Alexandria University, Faculty of Agriculture, Department of Economics and Agricultural Business Administration*, Pp. 28-29 July .
- Tarek. A. A., 2010. Agricultural Price Policy's Impact on the Production and Consumption of Some Medicinal and Aromatic Plants in Egypt. *Alex. J. Agri. Sci.* 1(1): Pp. 170-185.
- El-Nashara, W. Y., Elyamanyb, A. H., 2018. Managing risks of the Grand Ethiopian Renaissance Dam on Egypt, *Ain Shams Engineering Journal* ,Volume 9, Issue 4, December 2018, Pp. 2383-2388.

