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Export competitiveness of Egypt's Orange Export in the Most Important Foreign Markets Using an ideal demand system model (AIDS)

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Abstract: The research aims to analyze the competitiveness of Egypt's orange exports from 2009 to 2021. Using the revealed comparative advantage (RCA), Market Penetration Ratio (MPR), and Almost Ideal Demand System (AIDS) model. The result indicates that Egypt has a comparative advantage in foreign markets in producing oranges. Moreover, Egypt has its own-price inelastic demand in Russia, UAE, Saudi Arabia, and Netherlands markets but Egypt has its own-price elastic demand in the UK market. Meanwhile, the expenditure elasticities for Russia, UAE, Saudi Arabia, and the UK's oranges imports from Egypt are inelastic to the expenditure.

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Introduction:

In Egypt, oranges are a promising crop for increased export; it has an economic value that represents an essential source of foreign currencies. Hence, Egyptian orange exports can contribute to achieving the aims of the Egyptian agriculture policy in terms of worldwide demand. Therefore, the Action Strategy for Sustainable Agricultural Development (SADS) 2030 includes a target for promoting exports. **(**Elmenofi, El Bilali et al. 2014**,** Elnemr 2018**).**

Egypt is an important orange exporter. It ranks third among the top orange exporting countries worldwide after Spain, and South Africa, with ~11.21% of the total world orange exports as an average quantity for the period 2017 – 2020 (UN 2017 - 2020). However, orange export was unstable, where it increased from ~ 0.774 to 0.904 TTM in 2018 - 2019 while in 2020 decreased to ~ 0.691 TTM in 2020 (UN 2020). According to Egyptian Agriculture Export Council (AEC), Egyptian orange exports reached ~ 111 countries, including Russia, Saudi Arabia, Netherlands, United Arab Emirates (UAE), and the United Kingdom (UK) as Egypt's top main export destinations for oranges.

Therefore, analyzing the competitiveness of Egypt's orange export will be vital information, particularly in determining the marketing strategy for competing with competitor countries. Research on this subject is important because the estimation of own price elasticities, cross-price elasticities, and expenditure elasticities are highly crucial and helpful for policymakers to make policies according to the price and exports of rival countries.

Despite the government's efforts, the Ministry of Agriculture and Land Reclamation (MALR), to increase orange export, the export of oranges faces several challenges, which are related to the pluralism of importing countries, in addition to the difference in export prices to each importing country. Additionally, the competition that oranges encounter in the importing markets affects the exported quantities of oranges.

The research aims to analyze the competitiveness of Egypt's orange exports in the most critical importing markets from 2009 to 2021. In addition, study the competitive and substitutional relations between Egypt's exports of oranges and the exports of competing countries to find out the challenges and obstacles that impede the exports of oranges development and the possibility of increasing their competitiveness.

Methodology:

There are competitiveness indicators and models that analyze export competitiveness, including the revealed comparative advantage (RCA), and Market Penetration Ratio (MPR). In addition, an Almost Ideal Demand System (AIDS) model.

First, using the revealed comparative advantage (RCA) is an indicator established in the proposed work of Balassa (1965); Balassa (1977); and Balassa and statistics (1979) on the revealed comparative advantage (RCA). There are a plethora of studies in the literature discussing the RCA such as (Balassa and Statistics 1986); (Balassa and Noland 1989) (Bank 1994); (Bender 2001); (Bojnec and Fertő 2017); (De Benedictis, Gallegati et al. 2008, Serin, Civan et al. 2008); (Deardorff, Trade et al. 2011); (Kea, Li et al. 2020); (Laursen 2015); (Abu Hatab and Economics 2016) ; (Hejazi, Marchant et al. 2019); (Narayan and Bhattacharya 2019); and (Jambor and Czirkl 2022).

The formula of RCA is as follows:

$$RCA = \frac{X_{ij}/\sum_i X_{ij}}{\sum_i X_{ij}/\sum_i \sum_j X_{ij}} \qquad (1)$$

Where: RCA the revealed comparative advantage
X_{ij} exports to sector i from country j

If the RCA of a given commodity in a given country equals one, the percentage share of that commodity is the same as the average. If the RCA is, above one, the country is said to be specialized in that commodity and if the RCA is below one it is said not to be specialized.

Second, the Market Penetration Ratio (MPR) of any country in exporting a crop; it illustrates the extent of the ability to excess exports this crop in those markets (Mohammed and Baghdadi , Kotb, Mohamed et al. 2009, Mao and Zhang 2015, Gerhardt, Siluk et al. 2021, Alrwis, Duwais et al. 2022). The higher ratio of MPR, the more proof that the penetration rate for that commodity has increased in the markets (Mohammed and Baghdadi , Chirwa, Kumwenda et al. 2008).

The formula of MPR is as follows:

$$MPR_{\mathrm{ijk}} = \frac{\mathrm{I}_{JK}}{Q_{\mathrm{jk}} + \mathrm{I}_{\mathrm{jk}} - \mathrm{E}_{\mathrm{jk}}} \qquad (2)$$

Where: MPR Market Penetration Ratio
I_{JK} country j's total imports of good k
Q_{jk} Production of country (j) of commodity (k).
E_{jk} Country Exports (j) of commodity (k).

Finally, the analysis is using an Almost Ideal Demand System (AIDS) model which was introduced by Deaton and Muellbauer (1980). AIDS has been developed by (Eales and Unnevehr 1988); (Alston and Chalfant 1991); (Alston and Chalfant 1993); (Alston, Foster et al. 1994); (Jensen and Manrique 1998); (Moschini and Meilke 1989); and (Rougier 1997). On the other hand there are many studies in the literature discussing the export competitiveness analysis by an Almost Ideal Demand System (AIDS) model as (Bojnec and Fertő 2017); (Alnafissa and Alderiny 2020); and (Li, Wu et al. 2022).

In addition, an Almost Ideal Demand System model (AIDS) is commonly used to estimate the price and income elasticities of the demand for goods. Empirically, this model was selected to analyze the demand for Egypt's Oranges imported into foreign markets.

The model of AIDS is as follows:

$$\omega_i \vDash \alpha_i + \gamma_{ij} \ln \sum p_j + \gamma_i \ln\left(\frac{x}{p^*}\right) + \mu i \qquad (1)$$

Where:	ω_i:	Expenditure share of commodity	$\alpha, \gamma_{ij}, \gamma_i$:	Parameters
	p_j:	Price of commodity	X:	the total expenditure
	p^*:	price index	μi:	random or error term

The following restrictions have to be imposed on the parameters of Eq. (1) for consistency with the economic theory:

$$\sum_{i=1}^{m} \alpha_i = 1, \sum_{i=1}^{m} \beta_i = 0, \sum_{i=1}^{m} \gamma_{ij} = 0 \qquad (2)$$

"Adding-up" condition ensures that the expenditure shares always sum up to one

$$\sum_{j=1}^{m} \gamma_{ij} = 0 \qquad \text{(homogeneity)} \qquad (3)$$

$$\gamma_{ij} = \gamma_{jt} \qquad \text{(symmetry)} \qquad (4)$$

The price index (p^*) as defined in (5).

$$\ln p^* = \alpha_0 + \sum_{i=1}^{m} \alpha_i \ln p_i + \frac{1}{2} \sum_{i=1}^{m} \sum_{j=1}^{m} \gamma_{ij} \ln p_i \ln p_j \qquad (5)$$

To avoid collinearity of price variables, replaced Stones Price Index instead of p^* as follows:

$$\ln p^* = \sum_{i=1}^{n} \omega_i \ln p_i \qquad (6)$$

Where: ω_i: Expenditure share of country i.

According to (Alston, Foster et al. 1994); (Wildner and Cramon-Taubadel 2000); (Akbay and Engineering 2005), based on (1) and (5), the elasticity of the AIDS model are obtained as follows:

i. Total Expenditure Elasticity is

$$\eta_i = 1 + \frac{\beta_i}{\omega_i} \quad (7)$$

ii. Marshallian price elasticity is

$$\eta_{ij} = -\delta ij + \left(\frac{\gamma ij}{\omega_i}\right) - \left(\frac{\beta i}{\omega_i}\right)\left(\alpha j + \sum_{j=1}^{n} \gamma \,\text{ijln}\, pj\right) \quad (8)$$

Where: $\delta ij = 1$ for i = j and $\delta ij = 0$ for i ≠ j.

iii. Cross-price elasticities (η_{ij})

$$\eta_{ij} = -1 + \frac{\gamma_{ii}}{\omega_i} - \beta_i \quad (9)$$

$$\eta_{ij} = \frac{\gamma_{ij}}{\omega_i} - \beta_i \frac{\omega_j}{\omega_i} \quad (10)$$

Where: for i ≠ j.

Conclusions and Recommendations:

1. Competitiveness indicators

a. Revealed comparative advantage (RCA)

The empirical findings revealed comparative advantage is greater than one in all years of the research; this may mean that interpreted that the Egyptian orange has an apparent comparative advantage in foreign markets from 2009 to 2021 (Figure 1). Hence, the indicator was estimated between a minimum of ~ 23.6 in 2010 and a maximum of ~ 36.8 in 2019, with an average of ~ 30.3.

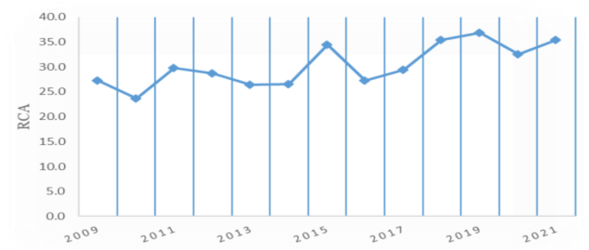

FIG.1 EGYPY RCA INDEX , 2009-2021

Market penetration ratio (MPR)

The results for the penetration rate of Egyptian orange exports among the most competing countries, given in Table 1, revealed that the highest value of the penetration rate was in the UAE and Saudi markets, with an average of ~0.91 and 0.43, respectively. These markets must be considered; due to the weakness of competition within it. In addition, the penetration rate values are few in Russia, and the Netherlands market, with a penetration rate of 0.33, and 0.24, respectively, meaning there is high competition facing Egyptian orange exports.

Table1. The market penetration ratio in principal markets, 2009- 2021.

Year	Russian	Saudi Arabia	United Arab Emirates	Netherlands
2009	0.33	0.60	1.22	0.17
2010	0.32	0.58	1.63	0.13
2011	0.40	0.62	6.31	0.10
2012	0.27	0.31	0.20	0.11
2013	0.47	0.59	0.37	0.17
2014	0.45	0.79	0.39	0.18
2015	0.32	0.35	0.21	0.11
2016	0.35	0.35	0.25	0.22
2017	0.26	0.25	0.19	0.34
2018	0.32	0.30	0.27	0.42
2019	0.34	0.32	0.28	0.31
2020	0.30	0.27	0.29	0.47
2021	0.20	0.21	0.20	0.38
Aver.	0.33	0.43	0.91	0.24

Source: Own composition based on UN Comtrade data.

2. Estimation of AIDS model

Given that the goal of this research was to investigate the foreign market's demand for Egypt's orange, the results and their explanations would essentially be focused on the results relating to Egypt's equation, with results relating to other suppliers being presented where necessary.

a. Parameter estimates of Russia's oranges import demand model

Egypt, South Africa, Turkey, and Morocco's orange exporters are the main for Russia's orange import demand. According to the results of the demand for Egyptian oranges in the Russian market, given in Table 2, this estimation satisfies adding up, homogeneity, and symmetry hypothesis. Furthermore, the majority of the estimated parameters have statistically significant coefficients at the level of 5%. The same Table shows the determination coefficients R^2s are 0.75 for the Egypt market; this implies that the model can explain 75% of the total variation in the market shares of the total orange imports by Russia while 25% is attributed to the error terms.

Marshallian price and expenditure elasticities

The expenditure and price elasticities for the orange from each supplier are reported in Table 3. All own-price elasticities are negative, as expected. Own-price elasticities range between -0133 for Egypt and -2.980 for Morocco. According to the findings, Egyptian orange imports are the least price sensitive, and a 1% rise in price will result in a 0.133% drop in import demand in the Russian market. The inelastic own-price elasticities for Egypt might suggest a stable relationship with Russia. Imported orange from South Africa, Turkey, and Morocco is the m high price sensitive such that with a 1% increase in price, the demand for those supplies of orange will decrease by 1.80%, 1.57, and 2.98 respectively.

The results showed that the cross-price elasticity for the Egypt- South Africa, Egypt- Turkey, and Egypt- Morocco pairs are a negative sign, meaning a complementary relationship between those suppliers on the Russian market.

Next, expenditure elasticities estimate the percent change in quantity when total expenditure on imported oranges increases by 1%. The expenditure elasticities range between 0.17 for Egypt and 3.79 for Morocco. The expenditure elasticities for imports from Egypt 0.17 indicate that imports are elastic to the expenditure. Orange imports from South Africa, Turkey, and Morocco have an expenditure elasticity is 1.02, 1.77, and 3.79, this indicates if the total expenditure on imported the orange change by 1%, imports from those Suppliers would change by 1.02%, 1.77%, and 3.79% respectively.

Table 2. Parameter estimates of the AIDS model for Russia's orange import demand model, 2009- 2021.

expenditure share E(wi)	Egypt LnP1		Africa South LnP2		Turkey Lnp3		Morocco LnP4	
	Coeffi.	t-stat.	Coeffi.	t-stat.	Coeffi.	t-stat.	Coeffi.	t-stat.
a	0.531	0.625	-1.926	-2.261	0.668	0.793	1.727	2.021
LnP_1	-0.662	-6.443	-0.427	-6.695	0.393	3.377	0.696	6.194
LnP_2	-0.791	-9.640	-0.204	-2.268	0.093	1.002	0.902	9.390
LnP_3	0.614	4.115	0.448	5.180	-0.592	-3.606	-0.471	-2.962
LnP4	0.845	7.318	0.185	1.534	0.104	0.917	-1.134	-9.407
LN_Y_P	-0.011	-0.251	0.116	2.536	-0.025	-0.556	-0.079	-1.732
.Adj. R- Sq	0.747		0.288		0.428		0.648	

Source: Own composition based on UN Comtrade data.

Table 3. Estimated Marshallian price and expenditure elasticities of Russia's orange import demand model

Supplier	Own price and Cross price				Elasticities Expenditure
	Egypt	South Africa	Turkey	Morocco	
Egypt	-0.133	0.317	0.137	-0.489	0.170
South Africa	-0.807	-1.802	0.001	0.719	1.019
Turkey	-2.622	0.042	-1.571	0.444	1.773
Morocco	-0.231	0.948	0.616	-2.980	3.789

Source: Own composition based on table (2).

b. Parameter estimates of UAE's oranges import demand model

Egypt, South Africa, Turkey, and Spain's orange exporters are the main for UAE's orange import demand. Table 4 donates the estimation results of the AIDS model for Egyptian oranges in the UAE market. The estimation satisfies adding up, homogeneity, and symmetry hypothesis, and the model fits the data well. Thus, the determination coefficients R^2s are 0.88 for the Egypt market; this reveals that the model can explain 88% of the total variation in the market shares of the total orange imports by Russia, while 12% is attributed to the error terms.

Marshallian price and expenditure elasticities

The findings also demonstrated that all own-price elasticities are negative, as would be expected. Egypt has own-price inelastic demand of 0.881, and with a 1% increase in price, the import demand will decrease by 0.881% in the UAE market. While Spain has its own-price inelastic demand of 0.402, with a 1% increase in price, the import demand will decrease by 0.402% in the UAE market. Moreover, South Africa and Turkey have their own-price elastic demand of -1.341 and -3.948 with a 1% increase in price; the import demand will decrease by 1.341 and 3.948%, respectively, in the UAE market.

From the findings, that the cross-price elasticity estimate for Egypt - South Africa and Egypt - Spain is a positive but low value of 0.198, and 0.144 this means limited competition between Egyptian and those suppliers. Moreover, the cross-price elasticity estimate for Egypt - Turkey is a negative sign, which means a complementary relationship between them. The expenditure elasticities for imports from Egypt -0.108 indicate that imports are elastic to the expenditure (Table 5).

Table 4. Parameter estimates of the AIDS model for UAE's orange import demand model, 2009- 2021.

expenditure share	Egypt LnP1		Africa South LnP2		Turkey Lnp3		Spain LnP4	
E(wi)	Coeffi.	t-stat.	Coeffi.	t-stat.	Coeffi.	t-stat.	Coeffi.	t-stat.
a	2.323	11.952	-1.324	-6.817	-0.153	-0.788	0.154	0.794
LnP1	0.002	0.064	0.123	5.911	0.068	2.620	-0.193	-6.211
LnP2	-0.003	-0.148	-0.080	-4.528	-0.059	-3.938	0.142	7.188
LnP3	-0.036	-2.916	0.065	6.803	-0.031	-2.675	0.002	0.170
LnP4	0.037	2.047	-0.107	-6.356	0.022	1.198	0.048	2.658
LN_Y_P	-0.113	-10.527	0.112	10.436	0.010	0.977	-0.009	-0.884
Adj. R2.	0.880		0.836		0.318		0.646	

Source: Own composition based on UN Comtrade data.

Table 5. Estimated Marshallian price and expenditure elasticities of UAE's orange import demand model

Supplier	Own price and Cross price				Elasticities Expenditure
	Egypt	South Africa	Turkey	Spain	
Egypt	-0.881	0.198	-0.108	0.144	0.649
South Africa	-0.198	-1.341	0.109	-0.166	1.190
Turkey	0.326	-5.947	-3.948	1.006	1.989
Spain	-0.599	1.795	0.026	-0.402	0.885

Source: Own composition based on table (4).

c. Parameter estimates of UK's oranges import demand model

Egypt, South Africa, Netherlands, and Spain's orange exporters are the main for UK's orange import demand. From the findings of the demand for Egyptian oranges in the UK market, which are shown in table 5, this estimation is tested by adding up, the homogeneity and symmetry hypothesis. Moreover, the majority of the estimated parameters have statistically significant coefficients at the level of 1%. The results also indicated that the determination coefficients R^2 are 0.45 for the Egypt market; this may mean that the model can explain 45% of the total variation in the market shares of the total orange imports by the UK (Table 6).

Marshallian price and expenditure elasticities

Table 7 reveals the price and spending elasticities for the orange from each supplier. Results indicate that imported the orange from Egypt, South Africa, Spain, and the Netherlands have own-price elastic demand of -1.671, -1.115, -1.332, and -1.580 respectively, this could be interpreted as a 1% increase in price will lead to a decline in quantity demand of more than 1%.

The results also indicated that the cross-price elasticity estimate for Egypt - Spain is a positive but low value of 0.425; this means the limited competition between Egyptian and Spain oranges. Moreover, the cross-price elasticity estimate for Egypt with Netherlands 1.211 indicated that Netherlands oranges are a strong substitute for Egypt oranges on the UK market. These findings imply that the competitive relationship between both countries is relatively weak since the cross-price elasticity is inelastic. Whereas the cross-price elasticity for Egypt- South Africa is a negative sign, meaning a complementary relationship between them.

Next, the expenditure elasticities range between 0.996 for Egypt and 1.631 for Netherlands. The expenditure elasticities for imports from Egypt 0.996 indicate that imports are elastic to the expenditure. Also, orange imports from South Africa and the Netherlands have an expenditure elasticity are 1.314 and 1.631 this indicates if the total expenditure on imported oranges changes by 1%, imports from those Suppliers would change by 1.31%, and 1.631% respectively. While the expenditure elasticities for imports from Spain 0.714 indicate that imports are inelastic to the expenditure (Table 7).

Table 6. Parameter estimates of the AIDS model for UK orange import demand model, 2009- 2021.

expenditure share	Egypt LnP1		Africa South LnP2		Spain Lnp3		Netherlands LnP4	
E(wi)	Coeffi.	t-stat.	Coeffi.	t-stat.	Coeffi.	t-stat.	Coeffi.	t-stat.
a	0.173	0.480	2.740	7.753	-1.399	-4.114	-0.514	-1.434
LnP_1	0.238	5.903	-0.200	-4.556	0.071	3.636	-0.109	-2.556
LnP_2	-0.105	-5.858	0.053	2.792	-0.015	-0.809	0.067	3.425
LnP_3	-0.143	-5.114	0.159	5.608	-0.087	-6.134	0.070	2.497
LnP4	0.010	0.625	-0.012	-0.763	0.031	2.254	-0.029	-1.781
LN_Y_P	-0.001	-0.040	-0.125	-6.268	0.093	4.876	0.033	1.628
.Adj. R^2	0.450		0.733		0.493		0.487	

Source: Own composition based on UN Comtrade data.

Table 7. Estimated Marshallian price and expenditure elasticities of UK's orange import demand model

Supplier	Own price and Cross price				Elasticities Expenditure
	Egypt	South Africa	Spain	Netherlands	
Egypt	-1.671	-0.491	0.761	0.048	0.996
South Africa	-0.359	-1.115	-0.190	0.066	1.314
Spain	0.425	0.206	-1.332	-0.013	0.714
Netherlands	1.211	1.096	-0.252	-1.580	1.631

Source: Own composition based on table (6).

d. Parameter estimates of Saudi Arabia's oranges import demand model

Egypt, South Africa, and Spain's orange exporters are the main for Saudi Arabia's orange import demand. The estimation results revealed the AIDS model for Egyptian oranges in the Saudi market is revealed in table 8. The estimation satisfies adding up, homogeneity, and symmetry hypothesis, and the model fits the data well. Hence, the determination coefficients R^2 are 0.97 for the Egypt market; this implies that the model can explain 97% of the total variation in the market shares of the total orange imports by Russia while 3% is attributed to the error terms.

Marshallian price and expenditure elasticities

All own-price elasticities are negative, as expected. Results denote that imported orange from Egypt is the least price sensitive, and with a 1% increase in price, the import demand will decrease by 0.655% in the Saudi market. The inelastic own-price elasticities for Egypt might suggest a stable relationship between Saudi and Egypt. Imported orange from Spain is the most price sensitive such that with a 1% increase in price, the demand for orange will decrease by 1.18%.

According to the findings, the cross-price elasticity for the Egypt- South Africa and Egypt- Spain pairs are a negative sign, meaning a complementary relationship between those suppliers on the Russian market. It leads to the conclusion that Egypt has no competitor in the Saudi orange market.

The expenditure elasticities for imports from Egypt 0.888 indicate that imports are inelastic to the expenditure. Orange imports from South Africa and Spain have an expenditure elasticity is 0.928, 4.152; this indicates if the total expenditure on imported oranges changes by 1% imports from those suppliers would change by 0.928% and 4.152%, respectively (Table 9).

Table 8. Parameter estimates of the AIDS model for Saudi Arabia's orange import demand model, 2009- 2021.

expenditure share	Egypt LnP1		Africa South LnP2		Spain Lnp3	
E(wi)	Coeffi.	t-stat.	Coeffi.	t-stat.	Coeffi.	t-stat.
a	1.832	13.422	0.789	5.789	-1.621	-13.610
LnP_1	0.168	27.245	-0.152	-23.835	-0.017	-4.941
LnP_2	-0.156	-24.340	0.139	19.889	0.018	6.066
LnP_3	-0.010	-9.507	0.013	12.121	-0.002	-2.432
LN_Y_P	-0.068	-8.687	-0.026	-3.357	0.094	14.026
.Adj. R^2	0.969		0.906		0.752	

Source: Own composition based on UN Comtrade data.

Table 9. Estimated Marshallian price and expenditure elasticities of Saudi Arabia's orange import demand model

Supplier	Own price and Cross price			Elasticities Expenditure
	Egypt	South Africa	Spain	
Egypt	-0.655	-0.217	-0.014	0.888
South Africa	-0.375	-0.948	0.039	0.928
Spain	-2.479	-0.558	-1.178	4.152

Source: Own composition based on table (8).

e. Parameter estimates of Netherlands's oranges import demand model

Egypt, South Africa, and Spain's orange exporters are the main for Netherlands's orange import demand. According to the demand in light of Egyptian oranges in the Dutch market, the analysis satisfies adding up, homogeneity, and symmetry hypothesis. In addition, the model fits the data well. On the other hand, the determination coefficients R^2 are 0.94 for the Egyptian market; meaning that the model can illustrate 94% of the total variation in the market shares of the total orange imports by the Netherlands while 6% is assigned to the error terms (Table 10).

Marshallian price and expenditure elasticities

The table (11) shows that all own-price elasticities are negative, as would be expected. Egypt has own-price inelastic demand of 0.959, and with a 1% increase in price, the import demand will decrease by 0.959% in the Dutch market. While Spain has its own-price inelastic demand of 0.401, with a 1% increase in price, the import demand will decrease by 0.401% in the Dutch market. Moreover, South Africa has its own-price elastic demand of 1.469, and with a 1% increase in price, the import demand will decrease by 1.469% in the Dutch market.

The findings also demonstrated that the cross-price elasticity estimates for Egypt - South Africa and Egypt- Spain pairs are positive but low at 0.486 and 0.509, respectively. It contributes to the low level of competitiveness between the Egyptian market and those orange suppliers.

The results revealed the expenditure elasticities for imports from Egypt were negative -0.032, which may not be consistent with expected signs. It could be due to Egyptian oranges being classified as having lower quality and low price. While, the expenditure elasticities for imports from South Africa and Spain were 0.996 and 1.674. It indicates if the total expenditure on imported oranges changes by 1%, imports from those suppliers would change by 0.996% and 1.674%, respectively, in the Dutch market.

Table 10. Parameter estimates of the AIDS model for Netherlands's orange import demand model, 2009- 2021

expenditure share	Egypt LnP1		Africa South LnP2		Spain Lnp3	
E(wi)	Coeffi..	t-stat.	Coeffi.	t-stat.	Coeffi.	t-stat.
a	3.754	15.391	0.559	2.574	-0.002	-0.179
LnP_1	-0.026	-0.792	-0.013	-0.493	-3.313	-14.390
LnP_2	-0.013	-0.515	0.272	7.652	0.039	1.303
LnP_3	0.040	1.316	-0.258	-7.971	-0.258	-8.014
LN_Y_P	-0.185	-15.148	-0.002	-0.179	0.218	5.011
.Adj. R^2	0.937		0.544		0.821	

Source: Own composition based on UN Comtrade data.

Table 11. Estimated Marshallian price and expenditure elasticities of Netherlands's orange import demand model

Supplier	Own price and Cross price			Elasticities Expenditure
	Egypt	South Africa	Spain	
Egypt	-0.959	0.486	0.509	-0.032
South Africa	-0.023	-1.469	-0.474	0.996
Spain	0.020	-1.297	-0.401	1.674

Source: Own composition based on table (10).

Conclusions and Recommendations

Egypt is an important orange exporter. It ranks third among the top orange exporting countries worldwide. The objective of this research is to estimate the competitiveness of Egypt's orange exports from 2009 to 2021. In addition, study the competitive and substitutional relations between Egypt's exports of oranges and the exports of competing countries. Three analyses were conducted using the revealed comparative advantage (RCA), and Market Penetration Ratio (MPR). Moreover, estimate import demand for Egypt oranges from Russia, Saudi Arabia, Netherlands, United Arab Emirates (UAE), and the United Kingdom (UK) as Egypt's top main export destinations for oranges using an Almost Ideal Demand System (AIDS) model to estimate own-price, cross-price and expenditure elasticities. The analysis indicates are as follows.

First, Egypt has a comparative advantage in foreign markets in producing oranges.

Second, the estimations of the AIDS model for Egyptian oranges in all of Egypt's main export markets satisfy adding up, homogeneity, and symmetry hypothesis.

Third, Egypt has its own-price inelastic demand in Russia, UAE, Saudi Arabia, and Netherlands markets; this indicates Egypt might suggest a stable relationship with those countries. While Egypt has its own-price elastic demand in the UK market.

Forth, the expenditure elasticities for Russia, UAE, Saudi Arabia, and the UK's oranges imports from Egypt are inelastic to the expenditure. On the other hand, the expenditure elasticities for Netherlands oranges imports from Egypt are negative, which may not be consistent with expected signs. It could be due to Egyptian oranges being classified as having lower quality and low price.

Based on these results,

First, the necessity of preserving the main traditional markets for Egyptian oranges because Egyptian oranges have a competitive advantage and a high ability to penetrate those countries.

Second, In terms of the UK market, the necessity to keep the level of prices exports to this market so that Egypt can raise its market share.

Third, In terms of the Netherlands market, the necessity improves the level of quality Egypt oranges to this market so that Egypt can raise its market share.

Forth, The necessity to provide information about export prices and production in the main competing countries.

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