An Economic Analysis of the External Demand for Egyptian Nitrogenous Fertilizers in the European Market Amidst the Russia-Ukraine Crisis

Mahmoud M. Elhabbaq and Fatma A. M. ElBateh [1]

ABSTRACT

Nitrogen fertilizers have long been a cornerstone of Egypt's export-led economic growth, providing a steady stream of foreign currency and helping to reduce the country's trade deficit. However, recent data reveals a decline in Egyptian nitrogen fertilizer exports, with shipments falling to 1.39 million tons in 2022 from a peak of 2.02 million tons in 2018. This downturn can be attributed to various global factors, including the Russia-Ukraine conflict.

This study investigates the increasing competitiveness of nitrogen fertilizers in global markets. By estimating demand functions using almost ideal demand model for the French, British, and Italian markets over the period 2011-2022, the study yields the following key findings:

1. **Nitrogen fertilizers dominate the global fertilizer market in terms of production, agricultural use, and exports, accounting for an average of 88.23%, 79.48%, and 90.42% of the market, respectively, during 2011-2022. Conversely, potash fertilizers dominated imports, accounting for 62.78% on average.**
2. **Egyptian nitrogen fertilizer exports increased from 1.21 million tons to 1.72 million tons on average during the periods 2011-2016 and 2017-2022, representing 3.04% and 4.68% of global nitrogen fertilizer exports, respectively.**
3. **European imports of nitrogen fertilizers grew from 8.84 million tons to 9.97 million tons on average during the same periods, accounting for 24.35% and 27.58% of global imports, respectively.**
4. **The average export price of Egyptian nitrogen fertilizers reached a low of $233.9 per ton in 2016 and a high of $807.6 per ton in 2022, with an overall average of $362.4 per ton.**
5. **France was the largest importer of Egyptian nitrogen fertilizers, with an average of 393.4 thousand tons (11.6% of total Egyptian exports) during 2018-2022. Italy, the UK, and Greece followed with average imports of 281.8, 156.2, and 152 thousand tons, respectively.**
6. **The almost ideal demand model for the French market revealed a price elasticity of demand of -31.7%. This implies that a 1% increase in Egypt's export price would lead to a 31.7% decrease in demand for Egyptian nitrogen fertilizers in the French market. Furthermore, the income elasticity of demand suggests that a 1% increase in total real expenditure on nitrogen fertilizers in France would lead to a 1.3% increase in expenditure on fertilizers from Belgium and a 5.12% increase in expenditure on fertilizers from Russia, relative to Egyptian fertilizers, indicating a competitive advantage for these countries in the French market.**
7. **Similar results were found for the British and Italian markets, with price elasticities of demand of -18.5% and -10.07%, respectively. The income elasticity of demand also showed that competing countries had a comparative advantage in these markets.**

Key Recommendations

1. **Comparative Price Analysis: Conduct a comprehensive analysis of export prices for competing nitrogen fertilizers to enhance Egypt's export competitiveness in the global market.**
2. **Preserving Competitive Advantage: Implement strategies to safeguard Egypt's competitive advantage for nitrogen fertilizers in key export markets.**
3. **Export Duty and Domestic Supply: Impose an export duty on all types of nitrogen fertilizer exports. However, companies that meet the Ministry of Agriculture's supply obligations to fully cover the country's domestic demand for nitrogen fertilizers should be exempt from this duty. The revenue generated from this duty should be allocated to support the agricultural sector.**
4. **Export Duty and Agricultural Support: Impose an export duty on nitrogen fertilizer exports and utilize the proceeds to fund agricultural services and development initiatives.**

Keywords: Nitrogenous fertilizers, Almost Ideal Demand System (AIDS), European market, Price elasticity of demand, Russo-Ukrainian War

INTRODUCTION

Nitrogenous fertilizers fall among those key industries to Egypt, which have great relevance to the agricultural economy and the general economy as well, where nitrogen is considered the primary limiting nutrient for crop production in Egypt; most of the country's agricultural land is deficient in this element. Nitrogen fertilizer production in 2022 was about 3.61 million tons, while domestic agricultural consumption reached about 1.33 million tons. This equates to an export surplus of 1.39 million tons valued at $2.76 billion (FAO, 2022 and UN COMTRADE Statistics, 2022). This indicates the importance of nitrogen

DOI: 10.21608/asejaiqjsae.2024.392182

[1] Agricultural Economics Dep., Faculty of Agriculture, Benha University

Received, October 10, 2024, Accepted November 17, 2024.

fertilizers for the enhancement of agricultural yield and high-value exports as contributors to Egypt's economy.

It forms a base for food security within the country and brings in substantial amounts of foreign exchange earnings through its exportation. The country is endowed with rich natural gas, a skilled workforce, and a strategic geographic location that places it ahead in fertilizer production.

In this direction, government policies and investments have been highly instrumental in the emergence of the industry, allowing Egypt to fulfill its domestic requirements and compete in most of the international markets. With the country's annual average production capacity at about 3 million tons of nitrogenous fertilizers as shown in Table (1), besides large deposits of phosphates, it proves leading in both the regional and global fertilizer markets. Besides, Egyptian export earnings related to fertilizers have increased substantially due to increasing global demand and Egypt's competitive advantage.

The nitrogenous fertilizer industry catalyzes economic growth and helps in attaining pertinent sustainable development goals related to food security, environmental stewardship, and poverty reduction (UN COMTRADE Statistics, 2022).

However, this industry is no different from many other sectors that have been dramatically influenced by the pace of global change in recent years. Arguably, the most noteworthy events are the COVID-19 pandemic and the Russo-Ukrainian War, which brought severe destruction to the global supply chains and thus much higher inflation and wild energy price fluctuations. These have consequently affected the cost of production and the competitiveness of Egyptian products in international markets, especially those within the European Union, which is considered one of the most important destinations for Egyptian nitrogenous fertilizer exports (FAO, 2022).

According to the trade map, fertilizer exports in Egypt were very high last year, posting a 75% increase to 2.8 billion dollars. Exports of fertilizers in the country went up by 1.2 billion dollars (UN COMTRADE Statistics, 2022).

One of the salient trends that marked Egypt's export of fertilizers was that it was dominated by European countries as its major importers. France, in 2022, took the lead to become the number one importer of Egyptian fertilizers, followed by Italy, Spain, Greece, and Belgium, with imports worth about $375 million. All of the latter together constituted about 77% of the total imports of Egyptian fertilizers to the European Union (UN COMTRADE Statistics, 2022).

The main importers of Egyptian fertilizers outside Europe include Britain, Brazil, India, and Romania, among others. These countries have a high demand for Egyptian fertilizers compared to the overall growth of the export sector of fertilizers in Egypt (Trademap, 2022).

The Almost Ideal Demand System (AIDS) model used in this paper is considered a flexible and theoretically sound framework for analyzing consumer demand patterns. Its functional form allows estimates of price and income elasticities, which provide insights into consumer responsiveness to changes in economic conditions. For this reason, the AIDS model proves to be quite useful for a great variety of applications in economics, such as demand analysis, policy evaluation, and marketing research.

Research Problem:

Despite Egyptian nitrogenous fertilizers being an important export commodity and among the top export commodities, it has recorded a slump in exported volumes over the past years. For the year 2022, exports reached 1.34 million tons from the peak year of 2018, when exports attained a high of 2.02 million tons (FAO, 2022). This can be attributed to disruptions worldwide, such as the Russia-Ukraine war.

Research Objective:

This paper attempts to investigate the effects of the crisis in Russia and Ukraine on Egyptian nitrogen fertilizer exports to the important European Union markets. The study will achieve this by estimating various demand functions for Egyptian nitrogen fertilizer exports in most of the important world markets using a an almost ideal demand model. It seeks to weigh up the possibilities for enhanced competitiveness of such exports in these markets. This study will achieve it by analyzing global and Egyptian nitrogen fertilizer production indicators, global trade in Egyptian nitrogen fertilizers, and estimating the optimal demand model to determine the demand functions for Egyptian nitrogen fertilizer exports in the three largest markets in terms of average quantity and value of imports of Egyptian nitrogen fertilizers over the period 2011-2022.

Research Methodology and Data Sources

This research has utilized both descriptive and quantitative analysis in pursuit of the stated objectives and has thus made use of several statistical techniques relating to mean, percentages, time trend equations, and estimation of an almost ideal demand model considering variation in supply sources, explaining changes in demand. This model elucidates the degree of competition among different sources and demonstrates how the expenditure function within the model reflects the behavior and pattern of imports, distinguishing

between import sources. The study also identifies the most significant influencing factors and analyzes the competitive relationship among import sources. It also depends on the value of expenditure on the commodity and not the quantity of each commodity.

The study will be based on secondary data sourced from FAO, trade map and UN COMTRADE studies and research material relevant to the topic.

This model, when applied to economic studies, assumes one of the two hypotheses: first, aggregation at the commodity level with no differentiation between commodities according to their import sources. This assumption could work if commodity prices vary by the same percentage but appears difficult in the case of agricultural commodity exports because of quality differences between products, disparate levels of customs tariffs, purchase contract terms, and storage and transportation services.

The second assumption is a complete separation of commodities based on their import sources, which may contradict logic.

Given the importance of distinguishing between import sources in analyzing import demand, some economic studies have suggested using this model while differentiating between import sources without imposing a complete separation constraint (Abo-Taleb and Amer, 2009).

Almost Ideal Demand System (AIDS) (Deaton and Muellbauer, 1980):

The Almost Ideal Demand System (AIDS) is a flexible functional form commonly used in economics to model consumer demand. The AIDS model provides a way to estimate how consumers allocate their expenditure across different goods as prices and income change.

$$\mathbf{Ln\,[E(P,U)] = (1-U)\,Ln\,[a(P)] + U\,Ln\,[b(P)]} \quad (1)$$

$$\mathbf{Ln\,[a(P)] = \alpha 0 + \sum \alpha k\,Ln\,Pk + \tfrac{1}{2} \sum k \sum j \gamma kj\,Ln\,Pk\,Ln\,Pj} \quad (2)$$

$$\mathbf{Ln\,[b(P)] = Ln\,[a(P)] + \beta 0 \prod k\,P\beta k} \quad (3)$$

By substituting equations (2) and (3) into equation (1), the expenditure function can be formulated as follows:

$$\mathbf{Ln\,[E(P,U)] = \alpha 0 + \sum \alpha k\,Ln\,Pk + \tfrac{1}{2} \sum k \sum j \gamma kj\,Ln\,Pk\,Ln\,Pj + \beta 0 U \prod k\,P\beta k} \quad (4)$$

By taking the partial derivative of the natural logarithm of the expenditure function, E (P,U), with respect to the natural logarithm of the price of good i, Pi, we can obtain the expenditure share of good i, Wi, as follows:

$$\frac{\partial Ln[E(P,U)]}{\partial Ln\,P} = \frac{Piqi}{E(P,U)} = Wi \quad (5)$$

Therefore, equation (4) can be reformulated as follows:

$$\mathbf{Wi = \alpha i + \sum j \gamma ij\,Ln\,Pk\,Ln\,Pj + \beta iU\,\beta 0 \prod k\,P\beta k} \quad (6)$$

By solving equation (4) for utility (U) and substituting the result into equation (6), we can obtain the following:

$$\mathbf{Wi = \alpha i + \sum j \gamma ij\,Ln\,Pj + \beta iLn\ \left[\frac{E}{Pindex}\right]} \quad (7)$$

Where

$$\mathbf{Ln\,(Pindex) = \alpha i + \sum k \alpha k\,Ln\,Pk + \tfrac{1}{2} \sum k \sum j \gamma kj\,Ln\,Pk\,Ln\,Pj} \quad (8)$$

Since the Pindex is nonlinear and difficult to estimate, it has been replaced by the geo mean-based Stones Price Index.

$$\mathbf{Ln\,(Pspi) = \sum i\,Wi\,Ln\,Pi} \quad (9)$$

Since Wi represents both the expenditure ratio and the dependent variable in the equations, using this raw figure might cause some immediate problems in the model's equations. Therefore, lag periods are used as follows:

$$\mathbf{Ln\,(Pspi) = \sum i W'i\,Ln\,Pi} \quad (10)$$

Where:

$$\mathbf{W'i = \tfrac{1}{2}\,(Wit + Wit\text{-}1)} \quad (11)$$

Note that the index Pindex can be considered as a linear approximation of the index Pspi in the case of high multicollinearity among prices, thus equation (7) becomes:

$$\mathbf{Wi = \alpha i + \sum j \gamma ij\,Ln\,Pj + \beta iLn\ \left[\frac{E}{Pspi}\right]} \quad (12)$$

Given the conditions imposed by the demand equation (12), which are

$\mathbf{\sum_i \alpha_i = 1,\ \sum_i \gamma_{ij} = 0,\ \sum_i \beta_i = 0}$ **Additivity -**

$\mathbf{\sum_j \gamma_{ij} = 0}$ **Homogeneity -**

$\mathbf{\gamma_{ij} = \gamma_{ji}}$ **for** $\mathbf{i \neq j}$ **Symmetry–**

These conditions are essential as they align the model with demand theory. The additivity conditions ensure that the sum of expenditure equals 1, meaning ($\sum$i Wi = 1), while homogeneity conditions guarantee

the homogeneity of demand functions. The symmetrical conditions, on the other hand, satisfy the Slutsky condition.

Where α, β, γ represent the function parameters, Pi is the price of the commodity in question, a(?)b(?) are functions of the function parameters and prices, m is the number of commodities within each group, Wi is the commodity's share of expenditure, Pi.qi is the price and quantity of the ith commodity respectively, E is the total expenditure on the commodity in question, Pindex is the price index, and Pspi is the Stone price index. Price, cross, and expenditure elasticities (Own, Cross, and Expenditure Elasticities) are calculated as follows:

Price and Cross-Price Elasticity and Their Matrix Representation

$\varepsilon_{Own,Cross} = -\delta_{ij} + (\gamma_{ij} / W_i) - \beta_i (W_j / W_i)$

(δ_{ij} = 1, where i = j) (m×m)

own-price elasticity (diagonal of a matrix)

Cross-price elasticity (Off-diagonal) (δ_{ij} = 0, where i≠ j)

-Expenditure elasticity $\varepsilon_{expend} = 1 + (\beta_i / W_i)$

To verify the accuracy of the results, the relationship between the weighted expenditure elasticities and the commodity's share of expenditure is measured as follows:

$\sum_i W_i \varepsilon_{expend} = 1$ (Deaton and Muellbauer, 1980).

In essence, the AIDS model provides a powerful tool for analyzing consumer demand. Its flexibility, theoretical foundation, and empirical applicability make it a widely used model in economics.

RESULTS AND DISCUTION

First: The Relative Importance of Nitrogen Fertilizers in the Egyptian Agricultural Economy

Table (1) shows that nitrogen fertilizers are the backbone of the Egyptian fertilizer industry. That proves that nitrogen fertilizers have played the most vital role in Egyptian agriculture. Nitrogen fertilizers always hold first place among various types of fertilizers in regard to production, agricultural consumption, and exports, averaging 88.23%, 79.48%, and 90.42%, respectively, during the period 2011-2022. On the contrary, potash fertilizers mostly dominated the import composition with an average of 62.78% within the same period.

The annual average consumption of nitrogen fertilizers reached about 1,243.4 thousand tons, while consumption of phosphatic and potash fertilizers was far behind. The percentage distribution of fertilizer consumption indicates domination by nitrogen fertilizers, which comprises 79.48% of the total consumption of fertilizers. The share of phosphatic fertilizers is 15.69%, while the share of potash fertilizers comprises less than 5% in total fertilizer consumption.

Table 1. Analysis of the Contribution of Nitrogen, Phosphorus, and Potassium Fertilizers to the Egyptian Agricultural Economy (2011-2022)

(Thousand Tons)

Year	Production			Agricultural Use			Export quantity			Import quantity		
	N	P	K	N	P	K	N	P	K	N	P	K
2011	2687.4	410.2	0	1207	150	57	1926.25	109.71	0.26	27.57	1.76	27.85
2012	2391.8	517.4	0	1086.8	163	60	1268.14	82.88	0.52	39.81	5.25	43.23
2013	2660	424.9	17.9	1104.1	279.3	70.1	1282.93	226.63	1.64	35.49	4.19	33.74
2014	2660	589.8	25.9	1124.6	253.2	66.3	892.63	177.38	4.06	15.23	5.30	43.98
2015	2200	402.96	17	1219.3	332.8	79.9	465.97	63.51	0.25	71.25	7.85	15.79
2016	2671.8	296.2	11	1280.5	226.4	76.1	1412.24	76.37	10.04	12.38	8.10	49.27
2017	3442.1	408.4	10.9	1314.9	263.1	94	1744.23	153.37	23.98	14.13	15.22	94.01
2018	3423.7	409.1	9.8	1334.2	222.1	75.8	2018.81	195.31	42.65	9.38	10.50	135.79
2019	3411.9	429.8	0	1253.4	279.2	92.1	1675.15	20.57	0.08	11.65	14.92	143.96
2020	3605.6	290	0	1331.9	258.7	78.9	1741.08	87.02	48.69	24.87	23.16	98.05
2021	3605.6	290	0	1331.9	258.7	78.9	1743.18	182.13	68.20	31.46	24.09	61.14
2022	3605.6	290	0	1331.9	258.7	78.9	1385.98	215.15	70.52	28.10	24.74	39.97
Mean	**3030.5**	**396.6**	**7.7**	**1243.4**	**245.4**	**75.7**	**1463.0**	**132.5**	**22.6**	**26.8**	**12.1**	**65.6**
%	**88.23**	**11.55**	**0.22**	**79.48**	**15.69**	**4.84**	**90.42**	**8.19**	**1.40**	**25.64**	**11.58**	**62.78**

Note: *N, P, and K represent nitrogen, phosphorus, and potassium, respectively. The percentage values in the last row represent the contribution of each column to the total.

Source: Calculated from the Food and Agriculture Organization's Statistical Database 2021, https://www.fao.org

While import and export volumes in Egypt have taken quite a few twists and turns during the period of 2011-2022, data illustrate that Egypt has come to rely heavily on fertilizer imports, especially nitrogenous and potash fertilizers, to meet local demand. In the case of nitrogenous and potash fertilizers, the average annual imports reached about 26.8 and 65.6 thousand tons, respectively, which testifies to a shortage of domestic production that could satisfy the steadily growing demand.

This has also brought out the differential growth rates in the consumption of various types of fertilizers during this period. While nitrogenous and phosphatic fertilizers showed marked growth, potash fertilizer consumption still remained relatively restricted. This can be due to a set of reasons, including but not limited to the nature of Egyptian soil, the response of various crops to nutrient availability, and agricultural policies in vogue**.**

It is observed that Egypt has recorded an averagely higher application rate for nitrogenous fertilizers compared to the European Union and global average. On average, the use of fertilizer per hectare reached about 342.69 and 333.62 kgs in Egypt during 2011-2016 and 2017-2022, correspondingly, against 83.18 and 76.22 kgs in the EU, while on global aspects, it reached 66.96 and 67.05 kgs correspondingly. This large gap in quantity certainly proves that Egyptian agriculture relies very heavily on using fertilizers to increase agricultural production with the aim of feeding the growing food demand.

While there has been some annual fluctuation, the overall trend suggests that fertilizer consumption in Egypt has shown a lasting increase. This is raising long-term concerns from environmental and economic perspectives about the potential for such intensive agricultural practice to be sustainable. In sharp contrast, continuous efforts are being taken within the EU to reduce dependence on chemical fertilizers by underlining higher importance to sustainable agriculture and environmental protection.

In this regard, Table (2) shows a very meager contribution by Egypt to the global nitrogenous fertilizer production average, with percentages of 3.19% for 2011-2016 and 3.26% for the year 2017-2022. Egypt is considered a big consumer of fertilizers, although its production capacity constitutes merely a small fraction of global production.

Table 2. Trends in Nitrogen Fertilizer Production and Consumption in Egypt, the European Union, and the World (2011-2022)

Year	Production (Million Tons)					Agricultural Use (Million Tons)					Use per area of cropland (kg/ha)				
	Egypt	%	EU	%	World	Egypt	%	EU	%	World	Egypt	change compare with the world	EU	change compare with the world	World
2011	2.69	2.49	10.01	9.29	107.74	1.21	1.15	9.37	8.92	104.99	333.43	413.21	73.02	12.39	64.97
2012	2.39	2.22	10.36	9.62	109.76	1.09	1.04	9.60	9.14	105.12	294.05	353.22	74.05	14.13	64.88
2013	2.66	2.47	10.51	9.76	114.87	1.10	1.05	9.91	9.44	106.87	295.93	349.60	77.64	17.96	65.82
2014	2.66	2.47	10.42	9.67	115.88	1.12	1.07	10.11	9.63	107.98	302.7	356.35	79.35	19.63	66.33
2015	2.20	2.04	11.00	10.21	120.86	1.22	1.16	10.34	9.85	106.65	321.73	393.15	81.46	24.86	65.24
2016	2.67	2.48	10.79	10.02	116.70	1.28	1.22	10.32	9.83	107.73	342.95	420.49	81.7	23.99	65.89
2017	2.55	2.36	10.52	9.76	114.30	1.17	1.11	9.94	9.46	106.56	315.13	379.90	77.87	18.24	65.52
Mean	3.44	3.19	11.16	10.36	117.69	1.31	1.25	10.50	10.00	109.95	342.69	-	83.18	-	66.96
2018	3.42	3.18	10.86	10.08	116.93	1.33	1.27	9.98	9.50	108.82	345.38	422.75	79.36	20.12	66.07
2019	3.41	3.17	11.75	10.91	122.58	1.25	1.19	9.85	9.38	108.39	319.58	385.09	78.16	18.64	65.88
2020	3.61	3.35	11.88	11.03	121.50	1.33	1.27	9.80	9.34	114.65	335.41	382.05	78.18	12.36	69.58
2021	3.61	3.35	11.57	10.73	120.21	1.33	1.27	9.52	9.07	113.09	330.41	382.98	75.88	10.92	68.41
2022	3.61	3.35	8.64	8.02	118.08	1.33	1.27	7.92	7.54	108.06	328.22	401.87	62.54	-4.37	65.4
Mean	3.52	3.26	10.98	10.13	119.50	1.32	1.25	9.60	9.10	110.49	333.62	-	76.22	-	67.05

Source: Calculated from the Food and Agriculture Organization's Statistical Database 2022, https://www.fao.org

On the other side, Table (3) shows that Egypt's average annual exports of nitrogenous fertilizer throughout the period 2011 to 2022 was about 1.46 million tons, which represented around 3.77% of the world average annual nitrogenous fertilizers exports in the same period, which is estimated at about 42.31 million tons. This trend of growth is such that exports by Egypt, for example, increased from an average of 1.21 million tons for the years 2011-2016 to 1.72 million tons for the years 2017-2022, or from 3.04% to 4.68% of global exports for these two periods.

According to Table (3), the average European import of nitrogenous fertilizers stood at 9.40 million tons between 2011 and 2022, accounting for over a quarter of total global imports estimated at 42.64 million tons. The imports by Europe appear also to follow a growth trend from an average of 8.84 million tons in 2011-2016 to 9.97 million tons in the two years that followed, thus accounting respectively for 24.35% and 27.58% of global imports in those periods.

Second: Foreign Trade Indicators:

a. Global Foreign Trade Indicators

1. Quantity of World Exports:

Table (3) illustrates that global nitrogenous fertilizer exports exhibited a fluctuating trend over the study period (2011-2022). The export volume ranged from a low of approximately 36.45 million tons in 2011 to a high of 47.48 million tons in 2020, with an annual average of around 42.31 million tons.

An analysis of the time trend of the development of the quantity of global exports of nitrogenous fertilizers, based on the statistical estimation results for the period 2011-2022 in Table (3), Equation (1), indicates that the quantity of global exports of nitrogenous fertilizers has shown a general upward trend of approximately 0.88 million tons per year, with a growth rate of about 2.08%. This trend was statistically significant at the 0.01 level, and the overall model was also statistically significant. The results also indicated that approximately 83% of the variations in the quantity of global exports of nitrogenous fertilizers can be attributed to variables that reflect the impact of the time factor.

Table 3. Evolution of Nitrogenous Fertilizer Exports and Imports Between Egypt and Europe: 2011-2022

Year	Exports (Million Tons)					Imports (Million Tons)				
	Egypt	%	EU	%	World	Egypt	%	EU	%	World
2011	1.93	5.28	8.28	22.73	36.45	0.028	0.08	7.82	21.63	36.14
2012	1.27	3.48	8.84	24.26	37.75	0.040	0.11	8.00	22.13	37.15
2013	1.28	3.52	8.18	22.43	38.75	0.035	0.10	8.46	23.41	39.06
2014	0.89	2.45	8.54	23.43	41.03	0.015	0.04	9.50	26.28	40.67
2015	0.47	1.28	8.18	22.43	42.40	0.071	0.20	9.62	26.62	42.05
2016	1.41	3.87	7.80	21.39	41.29	0.012	0.03	9.62	26.60	41.67
Mean	1.21	3.04	8.30	22.76	39.61	0.03	0.08	8.84	24.35	39.46
2017	1.74	4.78	8.65	23.73	42.91	0.014	0.04	10.39	28.75	43.82
2018	2.02	5.54	8.69	23.84	43.01	0.009	0.03	9.69	26.81	42.73
2019	1.68	4.60	8.74	23.97	45.94	0.012	0.03	9.94	27.50	46.58
2020	1.74	4.78	8.76	24.03	47.48	0.025	0.07	9.82	27.18	48.37
2021	1.74	4.78	8.63	23.68	46.89	0.031	0.09	9.68	26.78	48.37
2022	1.39	3.80	6.96	19.10	43.86	0.028	0.08	10.31	28.53	45.04
Mean	**1.72**	**4.68**	**8.41**	**22.98**	**45.02**	**0.02**	**0.05**	**9.97**	**27.58**	**45.82**

Source: Calculated from the Food and Agriculture Organization's Statistical Database 2022, https://www.fao.org

B. Indicators of Egypt's Nitrogenous Fertilizer Foreign Trade:

1. Evolution of Nitrogen Fertilizers Exports of Egypt (2011-2022):

It could be viewed from Table (1) in the appendix, which reflects the evolution of the value of nitrogen fertilizer exports from Egypt in millions of US dollars starting from 2011 and up to 2022. From the low of about $330 million in 2016 to the high of about $2,757.3 million in 2022, the average export value surged. This average for the period was about $1,172.9 million.

Trend in Egypt's Nitrogen Fertilizer Exports From Table (4), equation (2), it is seen that the value of nitrogen fertilizer exports has been growing at an average rate of $13.64 million per annum during the study period, which reflects a growth rate of about 8.9% per annum. The significance of this trend was confirmed at the 0.01 level, and the overall model was also found to be statistically significant.

The results further indicate that approximately 84% of the variations in the value of Egypt's nitrogen fertilizer exports can be attributed to a set of factors whose effects are captured by the time variable.

2. Evolution of the Export Price of Egyptian Nitrogenous Fertilizers (2011-2022)

Furthermore, the trend of the export price of nitrogenous fertilizers, in US dollars per ton, for the period 2011-2022, can be extracted from table 1 in the appendix. Evidence of this can be seen from the fact that the average export price was at a minimum in 2016, at about 233.9 USD/ton, while the maximum was in 2022, at about 807.6 USD/ton. Overall, the weighted average was about 362.4 USD/ton during the entire period.

This could be confirmed from the Trend Analysis of the export price in US dollars per ton of nitrogenous fertilizers exported from Egypt during the period 2011-2022 through equation (3) in Table (4), which noticed that in 2017, the price passed from a falling phase at a rate higher than -115.4 USD/ton/year to a rapid growth with an average rate over 90 USD/ton/year for the last years. These can be attributed to factors such as economic reforms instituted by the Egyptian government, increased demand globally for nitrogenous fertilizers, and improved investment climate in the fertilizer sector.

Results also highlight the fact that roughly 60 percent of movements in the export price of Egyptian nitrogenous fertilizers are related to a set of variables whose influence filters into this price series via a time-varying mixing variable.

3. Geographical Distribution of the Quantity of Egyptian Nitrogenous Fertilizer Exports to the World's Leading Countries during the period (2018-2022):

Table (5) shows that in the five-year period, 2018-2022, France emerged as the leading importer of nitrogenous fertilizers from Egypt, accounting for as high as 11.6% with an average annual import volume of about 393.4 thousand tons. This is closely followed by Italy, the United Kingdom, and Greece, importing an average of 281.8, 156.2, and 152 thousand tons, respectively, which translates into relative import shares of 8.3%, 4.6%, and 4.5%, respectively.

Table 4. Time Series Equations for the Evolution of Quantity, Value, and Price of Egyptian Nitrogen Fertilizer Exports during the period (2011-2022)

No.	Dependent Variable	Estimated Model	F	R^2
1	Export Quantity (Million Ton)	$y=6.98-2.98x+0.52x^2-0.025x^3$ (6.1)** (-4.1)** (4.01)** (-3.8)**	7.51*	0.74
2	Export Value (Million USD)	$y=1988.1-503.7x+45.4x^2$ (6.7)** (-4.8)** (5.8)**	23.05**	0.84
3	Export Price (USD/ton)	$y=574.6-115.4x+9.93x^2$ (5.2)** (-2.9)* (3.3)**	6.87*	0.60

Where:
Ŷi: Predicted value of the quantity, value, and price of Egyptian nitrogenous fertilizer exports.
iXˆ: Time variable where i = 1, 2, 3, ..., 12 (presumably representing 12 months).
T: Calculated value (likely refers to a specific statistical test or coefficient).
R²: Coefficient of determination (a measure of how well the model fits the data).
F: F-statistic (used to test the overall significance of the model).
(*) and (**): Indicate significance levels at 0.05 and 0.01, respectively.
Source: Calculated from data in Table (1) in the appendix.

Table 5. The geographical distribution of Egyptian nitrogen fertilizer exports to major world countries (2018-2022)

(thousand tons)

Country	2018	2019	2020	2021	2022	Average	Relative Importance (%)
France	519.5	432.8	469.7	218.96	325.9	393.4	11.6
United Kingdom	233.3	77.97	37.6	111.6	320.3	156.2	4.6
Italy	334.3	339.4	273.7	253.5	208.3	281.8	8.3
Spain	135.2	193.6	144.9	81.8	138.5	138.8	4.1
Romania	79.2	99.3	33.5	173.3	134.2	103.9	3.1
Greece	161.3	205.8	124.2	145.4	123.3	152.0	4.5
Bulgaria	143.5	112.5	39.5	31.4	80.5	81.5	2.4
Belgium	15.5	0.096	6.4	0	79.4	20.3	0.6
Others	2836.5	2618.4	2165.4	1781.7	843.7	2049.1	60.6
World	4458.3	4080.1	3294.9	2797.6	2254.2	3377	100

Source: UN COMTRADE Statistics 2022, https://comtradeplus.un.org

4. Geographical Distribution of Egyptian Nitrogen Fertilizer Exports (in millions of USD) during 2018-2022

Based on data from Table (6), during the period between 2018 and 2022, France topped the list with an average value of about $155.3 million, with a relative importance of about 12.2%, followed by Italy and the United Kingdom in the second and third places with an average value of about $107.2 million and $83 million, with relative importance about 8.4% and 6.5%, respectively. Spain ranked fourth with an average value of about $57.6 million and a relative importance of about 4.5%.

Third: Results of the Almost Ideal Demand Model Estimation in the Studied Markets:

a. The French Market:

Table (7) reveals the results of the an almost demand model for Egyptian nitrogenous fertilizer exports to the French market. It shows that there are no estimation problems that could affect the model's efficiency, such as autocorrelation, heteroscedasticity, and non-normal distribution (except for some equations). Furthermore, Insignificance of the Wald test in EViews has been confirmed, to be more specific, about the addition, homogeneity, and symmetry conditions. The model is valid.

Table 6. Geographical Distribution of the Value of Egyptian Nitrogenous Fertilizer Exports to Major World Countries (2018-2022)

(millions USD)

Country	2018	2019	2020	2021	2022	Average	Relative Importance (%)
France	143.9	126.9	135.9	92.5	277.2	155.3	12.2
United Kingdom	64.8	22.9	10.9	47.2	269.1	83.0	6.5
Italy	90.9	97.0	76.5	97.8	173.7	107.2	8.4
Spain	37.6	56.7	41.5	34.6	117.3	57.6	4.5
Romania	20.7	29.1	9.2	72.6	112.4	48.8	3.8
Greece	41.6	56.8	32.8	54.0	95.9	56.2	4.4
Bulgaria	39.0	32.0	11.2	12.8	68.1	32.6	2.6
Belgium	4.3	0.0	1.9	0.0	63.8	14.0	1.1
Others	780.8	761	619.4	740.6	699	720.3	56.5
World	1223.6	1182.5	939.2	1152.1	1876.6	1274.8	100

Source: UN COMTRADE Statistics 2022, https://comtradeplus.un.org

Table 7. Estimated Coefficients of an almost ideal Demand Model for Nitrogenous Fertilizers in the French Market (2011-2022)

Country	Egypt			Belgium			Russia		
	Coeffi.	**t-stat.**	**Prob.**	**Coeffi.**	**t-stat.**	**Prob.**	**Coeffi.**	**t-stat.**	**Prob.**
a	380.723	31.115	0.000	20.745	0.209	0.840	-362.3	-4.277	0.004
LnP_1	0.786	0.331	0.751	7.574	0.711	0.500	57.231	3.476	0.010
LnP_2	8.141	2.560	0.038	-18.13	-1.400	0.204	-37.07	-1.684	0.136
LnP_3	3.364	2.408	0.047	-5.288	-0.302	0.771	-26.38	-2.728	0.029
$Ln(E/P_{spi})$	-70.280	-32.71	0.000	15.095	0.746	0.480	67.914	4.566	0.003
Adj. RSq.	**0.99**			**0.39**			**0.74**		
F	**557.9****			**2.820**			**9.03****		

• Coeffi.: Coefficient, a numerical value that demonstrates the constant change of a dependent variable given one unit change of an independent variable in a regression model.
• t-stat: t-statistic, a measure employed in hypothesis testing to conclude the reliability of a coefficient.
• Prob.: Probability, the p-value associated with the t-statistic. It designates the probability of observing a t-statistic as extreme or more extreme if the null hypothesis is true.
• a: Constant term in the regression equation.
• Ln P1, Ln P2, Ln P3: Natural logarithms of prices for different products or time.
• Ln (E/PSpi): Logarithm of a ratio including Expenditure and one Price Index.
• Adj. R-Sq: Adjusted R-square. Overall goodness of fit measure considering the number of predictors
• F: F-statistic. Test of overall significance of the regression model.
(*) and (**): Indicate significance levels at 0.05 and 0.01, respectively.
Source: Calculated from data in Table (2) in the appendix.

Table (8) shows that the price elasticity of demand for Egyptian nitrogenous fertilizer export to the French market is elastic. At the same time, a rise in Egypt's export price by 1% reduces the quantity of nitrogenous fertilizer demanded by the French market by 31.7%. This, therefore, shows from an empirical point of view that nitrogenous fertilizer is highly responsive to price changes within the French market.

Cross-Price Elasticity of Demand

From data analysis, it follows that, in case of a 1% increase in the export price of nitrogenous fertilizers set by Egypt's competitors in the French market, Belgium and Russia, the percentage change in demand for their respective products will be correspondingly equal to 120.7% and 39.4%, respectively. Cross-price elasticity of demand for Egypt's competitors on the other side, signifies that a 1% increase in the export price of Egypt implies changes in demand for their products by -8.7% and 118.13%, respectively. This negative cross-price elasticity would imply that Egyptian nitrogenous fertilizers and those from Belgium and Russia are complementary, with the rise in the export prices of the latter resulting not in a substitution effect but in a joint increase in demand.

Income Elasticity of Demand

Regarding income elasticity of demand, a 1% increase in total real expenditure on nitrogenous fertilizers in the French market leads to a 1.3% and 5.12% increase in expenditure on nitrogenous fertilizers from Belgium and Russia, respectively, compared to Egyptian fertilizers. This would therefore mean that Belgian and Russian fertilizers enjoy a comparative advantage in the French market.

This, therefore, offers a very useful idea for the policymakers and also the various businesses in the market that deal with nitrogenous fertilizers. The complementarities between the fertilizers would thus indicate that the companies from Egypt, Belgium, and Russia may consider:

• **Joint marketing strategies:** Companies from Egypt, Belgium, and Russia can market their products together, spelling out the benefits derived when used together.

• **Price coordination:** Coordinated pricing strategy among those countries might be efficient to earn higher overall market share and profitability.

Competitive advantages entailed by Belgian and Russian fertilizers would imply the following for Egypt:

1) Product Differentiation: It needs to bring about some selling points of its fertilizers that will actually help customers distinguish it from the competition.

2) Branding and Marketing: More investment in creating a good brand image in the French market and targeting some specific marketing campaigns therein.

3) Cost Efficiency: The cost of production must be minimized so as to provide the merchandise at more competitive prices.

B. The British Market:

Table (9), which presents the results of the almost ideal demand model for Egyptian nitrogenous fertilizer exports in the Greek market, indicates the absence of estimation problems that could compromise the model's

efficiency. These problems include autocorrelation, heteroscedasticity, and non-normality. Furthermore, the Wald test in EViews, which is used to assess the significance of the restrictions imposed by the model (such as additivity, homogeneity, and symmetry), was found to be insignificant, confirming the model's validity.

As indicated by Table (10), the price elasticity of demand for Egyptian nitrogen fertilizer exports in the British market suggests that a 1% increase in Egypt's export price leads to an 18.5% decrease in the quantity demanded of nitrogen fertilizers in the British market. This implies that nitrogen fertilizer is a price-elastic good in the British market."

Table 8. Price, Cross-Price, and Income Elasticities of Demand for Nitrogenous Fertilizers in the French Market (2011-2022)

Commodity	Price & Cross-Price Elasticity			Income Elasticity
	Egypt	Belgium	Russia	
Egypt	-31.735	120.676	39.366	-1.380
Belgium	-8.662	-16.453	-5.026	1.298
Russia	-118.129	-210.565	-70.514	5.118

Source: Calculated from data in Table (7).

Table 9. Estimated Coefficients of the Almost Ideal Demand Model for Nitrogen Fertilizers in the British Market (2011-2022)

Country	Egypt			Netherlands			Russia		
	Coeffi.	t-stat.	Prob.	Coeffi.	t-stat.	Prob.	Coeffi.	t-stat.	Prob.
a	402.019	15.642	0.000	-259.4	-2.624	0.034	-362.3	-4.277	0.004
LnP_1	0.628	0.145	0.889	-13.6	-0.814	0.442	57.231	3.476	0.010
LnP_2	8.116	1.965	0.090	9.424	0.593	0.572	-37.07	-1.684	0.136
LnP_3	2.576	0.366	0.725	-2.085	-0.077	0.941	-26.38	-2.728	0.029
$Ln(E/P_{spi})$	-73.027	-19.48	0.000	58.617	4.065	0.005	67.914	4.566	0.003
Adj. RSq.	**0.98**			**0.72**			**0.007**		
F	**201.5****			**8.01****			**1.02**		

Source: Calculated from data in Table (3) in the appendix.

Table 10.Price, Cross-Price, and Income Elasticities of Demand for Nitrogenous Fertilizers in the British Market (2011-2022)

Commodity	Price & Cross-Price Elasticity			Income Elasticity
	Egypt	Netherlands	Russia	
Egypt	-18.512	125.381	40.873	-1.473
Netherlands	-34.485	-59.446	-19.151	2.159
Russia	-118.129	-210.565	-70.174	5.118

Source: Calculated from data in Table (9)

Cross-price elasticity of demand indicates that, due to a 1% change in the export price of nitrogen fertilizers set by Egypt's competitors in the British market-namely, the Netherlands and Russia-demand for their products is changed by approximately 125.4% and 40.9%, respectively. Also, the cross-price elasticity of demand from Egypt's competitors suggests that for every 1% increase in Egypt's export price for nitrogen fertilizers, demands for their products fall by around 34.5% and 118.13%, respectively. In the case of increasing export prices for both the Netherlands and Russia, a negative sign of cross-price elasticity would indicate the complementary relationship rather than competitive.

Income elasticity of demand shows that a 1% increase in total real expenditure on nitrogen fertilizers in the British market leads to a 2.2% and 5.12% increase in expenditure on nitrogen fertilizers from the Netherlands and Russia, respectively, compared to a decrease in expenditure on Egyptian exports. This would mean that competitors for Egypt are at a better advantage in the British market.

From the analysis, it would appear that:

• Competitors for Egypt, the Netherlands and Russia, are responsive to changes in Egypt's export price, as when the price of Egypt increases slightly, demand for their products falls considerably. The strong competitive relationship would mean that.

• More precisely, the income elasticity of demand for the Netherlands and Russia is higher compared to Egypt, which means that with increased total spending on nitrogen fertilizers, consumers tend to buy more from the Netherlands and Russia. This may indicate that either the products offered by them are more attractive or that there is higher brand loyalty towards them.

What follows are some of the characteristics of Egypt's competitors, showing a comparative advantage in the British market. This is evidenced by the relatively high-income elasticity of demand for their products and relatively inelastic demand for Egypt's products due to changes in prices.

C. Italian Market:

The results presented in Table (11), pertaining to the almost ideal demand model for Egyptian nitrogenous fertilizer exports in the Italian market, indicate the absence of any significant estimation issues that might compromise the model's efficacy. Specifically, tests for autocorrelation, heteroscedasticity, and non-normality of the residuals did not reveal any problematic patterns .

The Wald test, carried out in the EViews statistical software, also supported the model's validity through the failure to reject all null hypotheses for the restrictions imposed by the theoretical model, including additivity, homogeneity, and symmetry conditions. These results, taken together, hint at the estimated model representing a valid version of demand for Egyptian nitrogenous fertilizers in the Italian market.

Table (12): Price Elasticity of Demand for Egyptian Nitrogenous Fertilizer Exports to the Italian Market from Table (12), it is identifiable that the demand for Egyptian nitrogenous fertilizer exports to the Italian market is highly elastic. Specifically, a rise of 1% in Egypt's export price leads to a fall in the quantity demanded of Egyptian nitrogenous fertilizer in Italy by 10.07%.

Secondly, the cross-price elasticity of demand analysis implies that Egyptian nitrogenous fertilizer exports face a high level of competition from both German and Russian firms in the Italian market. For example, a 1% increase in the export price of German nitrogenous fertilizer results in a 60.9% change in the demand for German fertilizer-an exemplary show of competitiveness bet

ween the products exported by Egypt and Germany. It means that for every 1% change in the export price of Russian nitrogenous fertilizer, there is a 19.4% change in the demand for Russian fertilizer. That's quite a decent share of competition from Russia.

Table 11. Estimated Coefficients of the Almost Ideal Demand Model for Nitrogen Fertilizers in the Italian Market (2011-2022)

Country	Egypt			Germany			Russia		
	Coeffi.	**t-stat.**	**Prob.**	**Coeffi.**	**t-stat.**	**Prob.**	**Coeffi.**	**t-stat.**	**Prob.**
a	215.074	7.592	0.000	-34.46	-2.287	0.056	-80.61	-4.598	0.002
LnP_1	12.118	1.709	0.131	4.927	1.306	0.233	-17.05	-3.884	0.006
LnP_2	5.396	1.661	0.141	0.410	0.237	0.819	-5.807	-2.888	0.023
LnP_3	-11.734	-1.547	0.166	-0.225	-0.056	0.957	11.959	2.547	0.038
$Ln(E/P_{spi})$	-35.424	-10.88	0.000	3.728	2.154	0.068	31.695	15.736	0.000
Adj. RSq.		**0.92**			**0.48**			**0.960**	
F		**33.3****			**3.58***			**75.00****	

Source: Calculated from data in Table (4) in the appendix.

Table 12. Price, Cross-Price, and Income Elasticities of Demand for Nitrogenous Fertilizers in the Italian Market (2011-2022)

Commodity	Price & Cross-Price Elasticity			Income Elasticity
	Egypt	Germany	Russia	
Egypt	-10.069	60.869	19.387	-0.200
Germany	-2.079	-4.701	-1.220	1.074
Russia	-57.784	-97.573	-31.781	2.922

Source: Calculated from data in Table (11)

The cross-price elasticity of demand analysis shows that Egypt's nitrogen fertilizer exports and those of its competitors, such as Germany and Russia, are complementary. A 1% increase in the export price of Egypt decreases the demand for its fertilizers by its competitors; the most considerable rate of reduction applies to [Country with -57.8% elasticity]. This would suggest that when the prices of nitrogen fertilizers from all three countries increase, the demand for them rises together, implying that they are not close substitutes but perhaps complements.

This implies that, in terms of income elasticity, German and Russian export supplies of nitrogen fertilizer to the Italian market are more responsive to changes in income compared to the exports from Egypt. For every 1% rise in total real expenditure on nitrogen fertilizers in Italy, demand for the fertilizers supplied by Germany and Russia rises more than proportionately. This would mean the countries with more market share could be more competitive in prices or offer higher qualities on the Italian market.

The provided data suggests that:

Complementary goods: Nitrogen fertilizers from Egypt, Germany, and Russia might be used together, rather than being direct substitutes.

- **Competitive advantage of Germany and Russia:** Both Germany and Russia are in a better position in the Italian market for reasons of, probably, low prices or quality issues or even pre-existing relations with Italian buyers.

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Appendix:

Table 1. Evolution of Quantity, Value, and Export Price of Egyptian Nitrogenous Fertilizer Exports (2011-2022)

Year	Quantity of Exports (Million Tons)	Value of Exports (Million USD)	Export Price (USD/Ton)
2011	4.19	1354.5	323.1
2012	3.00	1362.6	453.8
2013	2.81	1077.1	383.4
2014	1.97	644.7	326.6
2015	1.06	330.7	312.1
2016	1.41	330.0	233.9
2017	3.90	1002.2	256.7
2018	4.43	1215.8	274.5
2019	4.05	1173.9	289.9
2020	4.15	1157.2	278.7
2021	4.08	1668.5	408.7
2022	3.41	2757.3	807.6
Mean	**3.21**	**1172.9**	**362.4**

Source: UN COMTRADE Statistics 2022, https://comtradeplus.un.org

Table 2. Evolution of the Quantity and Value of French Imports of Nitrogenous Fertilizers (2011-2022)

Country	Quantity of Imports from (Thousands Tons)			Value of Imports (Million USD)		
	Egypt	Belgium	Russia	Egypt	Belgium	Russia
2011	719.9	1211.62	208.214	303.4	437.3	85.6
2012	714.8	1188.088	115.575	304.3	402.3	48.0
2013	669.1	1238.41	261.374	236.9	402.0	94.5
2014	482.2	1246.971	413.01	164.6	379.2	139.4
2015	238.2	1314.545	471.449	62.3	325.4	117.9
2016	491.4	1187.978	720.699	108.0	227.6	121.8
2017	694.8	1163.879	686.875	180.4	227.9	124.5
2018	474.6	970.259	739.344	131.6	215.1	147.2
2019	460.4	951.23	382.615	133.6	214.8	77.3
2020	530.8	1029.073	124.947	133.2	208.4	26.9
2021	481.2	944.826	261.268	202.9	284.2	110.8
2022	576.8	853.651	438.406	476.3	511.3	277.4
Mean	**544.5**	**1108.4**	**401.98**	**203.1**	**319.6**	**114.3**

Source: UN COMTRADE Statistics 2022, https://comtradeplus.un.org

Table 3. Evolution of the Quantity and Value of British Imports of Nitrogenous Fertilizers(2011-2022)

Country	Quantity of Imports from (Thousands Tons)			Value of Imports (Million USD)		
	Egypt	**Netherlands**	**Russia**	**Egypt**	**Netherlands**	**Russia**
2011	201.0	558.217	137.778	93.4	203.4	52.5
2012	189.8	629.149	110.979	87.0	213.4	41.7
2013	172.8	585.227	166.774	65.7	158.5	58.3
2014	67.4	645.493	161.614	25.1	172.6	55.0
2015	48.6	600.166	212.665	20.1	137.2	64.3
2016	158.2	586.336	166.182	45.2	97.7	36.8
2017	173.5	638.515	123.048	41.2	121.1	29.7
2018	231.3	533.031	253.487	70.5	112.7	62.6
2019	68.7	660.945	227.416	21.4	137.1	61.7
2020	62.6	563.294	229.226	15.5	104.5	56.1
2021	157.8	541.629	150.737	99.4	169.9	72.3
2022	556.6	538.356	302.805	486.8	322.5	196.0
Mean	**174.04**	**590.03**	**186.89**	**89.3**	**162.5**	**65.6**

Source: UN COMTRADE Statistics 2022, https://comtradeplus.un.org

Table 4: Evolution of the Quantity and Value of Italian Imports of Nitrogenous Fertilizers (2011-2022)

Country	Quantity of Imports from (Thousands Tons)			Value of Imports (Million USD)		
	Egypt	**Germany**	**Russia**	**Egypt**	**Germany**	**Russia**
2011	344.5	24.717	58.753	146.2	34.3	22.7
2012	185.3	66.52	78.73	90.9	27.3	32.9
2013	259.9	70.811	95.975	112.9	29.4	25.4
2014	261.2	50.536	99.218	106.5	24.4	31.4
2015	102.3	48.277	147.716	33.8	19.4	44.5
2016	356.5	53.313	138.67	90.4	19.7	30.4
2017	384.5	49.651	140.707	99.5	19.5	35.9
2018	419.1	52.792	152.418	118.4	22.2	38.3
2019	400.4	56.508	137.567	113.3	21.2	36.6
2020	465.5	57.882	44.677	126.5	21.4	10.8
2021	435.1	56.712	2.07	170.6	28.9	0.977
2022	378.6	119.743	63.774	296.2	71.6	41.2
Mean	**332.7**	**58.96**	**96.69**	**125.4**	**28.3**	**29.3**

Source: UN COMTRADE Statistics 2022, https://comtradeplus.un.org

الملخص العربي

دراسة اقتصادية للطلب الخارجي للأسمدة النيتروجينية المصرية في السوق الأوروبي في ظل الأزمة الروسية الأوكرانية

محمود مصطفي الهباق و فاطمة أحمد مصطفي البطح

يعتبر التصدير ركيزة أساسية يستند عليها الانطلاق الاقتصادي في توفير مصادر دائمة للنقد الأجنبي، ووسيلة لخفض العجز في الميزان التجاري المصري، وتتمثل مشكلة البحث في تراجع الأسمدة النيتروجينية المصرية كسلعة تصديرية واعتبارها من أهم السلع التصديرية الرئيسية، في الفترة الأخيرة حيث بلغت ١,٣٩ مليون طن عام ٢٠٢٢ بعد ما بلغت أقصى حد لها عام ٢٠١٨ بنحو ٢,٠٢ مليون طن نتيجة للتغيرات العالمية مثل الحروب الروسية الأوكرانية.

حيث استهدفت الدراسة المنافسة القوية للأسمدة النيتروجينية في الأسواق العالمية. من خلال تقدير دوال الطلب على الأسمدة النيتروجينية باستخدام نموذج الطلب شبه الأمثل في السوق الفرنسي والسوق البريطاني والسوق الإيطالي خلال الفترة (٢٠١١-٢٠٢٢).

وتوصل البحث إلى النتائج التالية:

١-أن الأسمدة النيتروجينية تأتي في المرتبة الأولى بين أنواع الأسمدة الأخرى سواء على مستوى الإنتاج أو الاستخدام الزراعي أو الصادرات حيث تمثل حوالي ٨٨,٢٣%، ٧٩,٤٨%، ٩٠,٤٢% على الترتيب كمتوسط للفترة ٢٠١١-٢٠٢٢ بينما أحتلت الواردات من الأسمدة البوتاسية المرتبة الأولي بنسبة ٦٢,٧٨% كمتوسط لنفس الفترة.

٢-تبين تزايد كمية صادرات الأسمدة النيتروجينية المصرية من نحو ١,٢١ مليون طن إلى حوالى ١,٧٢مليون طن كمتوسط للفترتين (٢٠١١-٢٠١٦) و(٢٠١٧-٢٠٢٢) بما يمثل نحو ٣,٠٤%، ٤,٦٨% من صادرات الأسمدة النيتروجينية العالمية خلال الفترتين على الترتيب.

٣-كما تبين تزايد كمية واردات الأسمدة النيتروجينية الأوروبية من نحو ٨,٨٤ مليون طن إلى حوالى ٩,٩٧ مليون طن كمتوسط للفترتين (٢٠١١-٢٠١٦) و(٢٠١٧-٢٠٢٢) بما يمثل نحو ٢٤,٣٥%، ٢٧,٥٨% من واردات الأسمدة النيتروجينية العالمية خلال الفترتين على الترتيب.

٤-تبين أن متوسط سعر التصدير قد بلغ أدناه عام ٢٠١٦ بحوالي ٢٣٣,٩ دولارللطن، بينما بلغ أقصاه عام ٢٠٢٢ بحوالي ٨٠٧,٦ دولار للطن، وبلغ المتوسط العام للفترة ككل حوالي ٣٦٢,٤ دولار للطن.

٥-جاءت فرنسا في المرتبة الأولى من حيث أهم الدول المستوردة للأسمدة النيتروجينية المصرية حيث قدر متوسط كمية وارداتها بحوالي ٣٩٣,٤ ألف طن وبأهمية نسبية بلغت حوالي ١١,٦ % خلال الفترة (٢٠١٨-٢٠٢٢)، وجاءت كلا من إيطاليا وبريطانيا واليونان في المرتبة الثانية والثالثة والرابعة بمتوسط بلغ نحو ٢٨١,٨، ١٥٦,٢، ١٥٢ ألف طن بأهمية نسبية بلغت نحو ٨,٣، ٤,٦، ٤,٥% على الترتيب خلال نفس الفترة.

٦-أوضحت نتائج نموذج الطلب شبه الأمثل في السوق الفرنسي أن مرونة الطلب السعرية بلغت -٣١,٧%، ويعني ذلك أن الزيادة في سعر تصدير مصر بنحو ١% يؤدي إلى انخفاض الطلب على الأسمدة النيتروجينية في السوق الفرنسي بحوالي ٣١,٧%، ويعني ذلك أنها سلعة ذات طلب مرن في هذا السوق، وفيما يتعلق بمرونة الطلب الإنفاقية تبين أن زيادة اجمالي الانفاق الحقيقي على الأسمدة النيتروجينية في السوق الفرنسي بحوالي ١% يؤدي الي زيادة الانفاق على الأسمدة النيتروجينية

من بلجيكا وروسيا مقارنة بالأسمدة المصرية بحوالي ١,٣%، ٥,١٢% علي الترتيب ويشير ذلك إلى تمتعهم بميزة تنافسية في السوق الفرنسي.

٧-تم الحصول على نتائج مماثلة للأسواق البريطانية والإيطالية، حيث بلغت مرونة الطلب السعرية -١٨,٥% و-١٠,٠٧% على التوالي. كما أظهرت مرونة الطلب السعرية أن الدول المتنافسة تتمتع بميزة تنافسية في هذه الأسواق.

أهم التوصيات:

١- دراسة أسعار تصدير الدول المنافسة لزيادة القدرة التنافسية للأسمدة المصرية.

٢- ضرورة العمل على الحفاظ على الميزة التنافسية للأسمدة النيتروجينية المصرية في الأسواق الرئيسية.

٣- فرض رسم صادر على الصادرات من الأسمدة النيتروجينية بكافة أنواعها على أن يعفى من هذا الرسم الشركات التي تفي بالالتزامات التي تحددها وزارة الزراعة لكافة الشركات والتي تغطى كافة احتياجات البلاد من الأسمدة النيتروجينية مع توجيه هذه الرسوم كدعم لخدمة القطاع الزراعي.

٤- فرض رسوم تصدير على الصادرات من الأسمدة النيتروجينية مع توجيه حصيلتها لدعم خدمات قطاع الزراعة.

الكلمات المفتاحية: الاسمدة النيتروجينية، الطلب شبه الأمثل، السوق الأوروبي، مرونة الطلب، الحرب الروسية الأوكرانية.