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## Egyptian Foreign Fish Trade: Current Conditions, Effects, and Export Efficiency Samy Ghenmy\*, Shima M. AL. Abosena, Mohamed M. R. Elhedeny

*Department of Economics and Agricultural Extension - Faculty of Technology and Development - Zagazig University - Egypt.*

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### ABSTRACT

The research aimed in general at identifying the current situation of foreign Fish Trade and the most important Factors affecting it during the period (2001-2021), the Results showed that there is a deficit in the Fish Balance throughout the study period, with an average value of about 363.38 million dollar, with an annual growth rate of about 8%, during the same period. By studying the variables most affecting the value of Egyptian fish imports and Exports, it was shown that the variables most affecting the value of Imports are the population and the Fish Gap, where an increase in the population by one million people leads to an increase in the value of Egyptian fish imports about 11.82 million dollar. The Egyptian Fish industry increased the value of Imports about 0.71 million dollar. It was also as previous that the most influencing variables on the value of Egyptian fish exports are the population of Saudi Arabia and Saudi Imports of fresh and chilled fish. An increase in the population of Saudi Arabia about 10% leads to an increase in the value of Egyptian Fish Exports about 50.05%. Increasing Saudi Imports of fresh and chilled fish about 10% will lead to an increase in the value of Egyptian fish Exports about 8.20%. Also, the Export Efficiency is low, reaching about 51.07%, which indicates a low feasibility of fish export. The research recommends the need to open new Export Markets.

### INTRODUCTION

The foreign trade sector is considered one of the sectors with a high and distinguished position in the Egyptian Economy, as it is a source of providing foreign exchange through Export revenues, which are used in economic development, It also represents the most Important pillars of Economic development (Soliman, 2018). By using it, countries achieve strong economic integration, and work to bridge the deficit in local production between countries and some of them. Accordingly, Egypt's Imports and Exports of fish amounted to about 323.30, 97.251 thousand ton, respectively, during 2021 (Central Agency for Public Mobilization and Statistics, 2022), fish production contributes to agricultural sector amounted to about 2399 million dollar in 2021 (Ministry of Agriculture and Land Reclamation, 2022).

Fish production is also considered one of the important sources of animal protein that contributes to bridging the nutritional gap of red and white meat, especially in times of the spread of animal and domestic diseases (Soliman, 2016), which increases the demand for fish, As the quantity of Domestic Production amounted to 2002 thousand ton, with a self-sufficiency rate of about 89.85%, the quantity available for consumption from red and white animal Production Meat reached about 5.803 million ton in 2021, the percentage of Fish in which is about 38.39%.

The amount available for consumption of animal products reached All about 12.87 million ton, the proportion of Fish in it is about 17.32%, for the same year (Central Agency for Public Mobilization and Statistics, 2022).

### RESEARCH PROBLEM

The research problem is related to the high Fish Balance deficit year after year, which amounted to about 501.03 million dollar, which indicates an increase in the value of Imports over the value of

\*\* Corresponding author: **Samy Ghenmy**

E-mail addresses: [samyali@zu.edu.eg](mailto:samyali@zu.edu.eg)

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Exports, which amounts to about 553.21, 52.18 million dollar, respectively, which resulted in a decrease in the per capita share of Fish available for consumption, as it reached about 21.83 kg/year, Likewise, the per capita share of the value of exports decreased, reaching about 0.51 dollar during 2021 (**Central Agency for Public Mobilization and Statistics, 2022**). despite the large water area that Egypt possesses, which amounts to about 15.08 million Fadden, including Fish farming in 2020 (**Lakes and Fish Resources Protection and Development Authority, 2021**), which requires a study to find out the causes and factors Which leads to this deficiency and how to avoid it. So the research will answer the following questions: What is the current situation of foreign Fish Trade, what are the most Important Factors affecting Fish Exports and imports, what is the most important exporting and importing countries to and from Egypt, and the most important proposals and recommendations to improve the Fish balance?

#### RESEARCH OBJECTIVE:

Consistent with the research problem, the research aimed to shed light on the current situation of Egyptian fish production as well as foreign fish trade and the most important factors affecting it during the period (2001-2021) by achieving the following sub-objectives:

- 1- Studying the current situation of foreign Fish Trade.
- 2- Shedding light on the most important countries Importing and Exporting to and from Egypt.
- 3- Studying the most important Factors affecting Egyptian Fish Exports and Imports.
- 4- Studying some indicators of Fish foreign trade.
- 5- Developing some proposals and recommendations that help in improving the Fish Balance.

#### RESEARCH IMPORTANCE:

The importance of the research is due to shedding light and identifying the conditions of foreign Fish Trade and thus it is possible to stand on the most Important Fish Products that affect the domestic and external demand, as well as to identify the most important reasons that help to increase the deficit in the Fish Balance and how to avoid it by making some recommendations and proposals that help reduce The Fish deficit, as well as identifying the most important countries that

absorb Egyptian fish and how to increase its exports while taking advantage of the large water area that Egypt possesses.

#### RESEARCH METHOD:

The research relied on two types of Analysis, qualitative statistical Analysis to determine the research Problem using arithmetic averages and relative importance, and quantitative statistical analysis to determine economic variables in terms of their trends and growth rates using simple and multiple regression in its different general and double logarithmic forms, using statistical programs (Microsoft Excel, SPSS). **Among the most important Methods used:**

##### 1- Geographical concentration coefficient: (Gini – Herchman) (Abdelhakem *et al.*, 2017)

It is used to calculate the degree of geographical concentration of Exports or Imports of a specific commodity or group of commodities during a certain period of time; it is calculated by the following Equation:

$$C_i = \sqrt{\sum \left(\frac{X_{ij}}{X_i}\right)^2} \cdot 100$$

**C<sub>i</sub>**: Geographical Concentration Coefficient.

**X<sub>ij</sub>**: Value or Quantity of Exports or Imports of Commodity i to Countries j.

**X<sub>i</sub>**: Total Value or Quantity of Exports or Imports of Commodity i.

This coefficient reaches its maximum degree, which is 100% in the event that the commodity is exported to only one Country, in general, the Geographical Concentration Coefficient is considered high if the value is greater than 40%. Whenever it is lower than that, it indicates the diversity of Exports or Imports for a number of countries.

##### 2- Commodity concentration coefficient: (Gini – Herchman) (Abdelhakem *et al.*, 2017)

It is used to calculate the degree of commodity concentration for Exports of a specific commodity or group of commodities during a certain period of time, it is calculated according to the following Equation:

$$C_i = \sqrt{\sum \left(\frac{X_{ij}}{X_i}\right)^2} \cdot 100$$

**C<sub>i</sub>**: Commodity Concentration Coefficient.

**Xij:** Value or Quantity of Exports or Imports of commodity i.

**Xi:** Total Value or Quantity of Exports or Imports of commodity i.

This Coefficient reaches its maximum degree, which is 100% in the event that the exported commodity is only one, in general the Commodity Concentration Coefficient is considered high if the value is greater than 40%, the lower it is, the more it indicates the diversity of Exports or Imports on a number of commodities.

### 3- Average of per capita share from Imports:

It is the average per capita income from the Value of Total Imports. It is obtained by dividing the Total Value of national Imports by the population (**Ministry of Agriculture and Land Reclamation, 2022**).

Average per capita Imports = (Value Fish Imports / population)

### 4- Average per capita share of Exports:

It is the Average of what an individual gets from the value of Total national Exports. It is obtained by dividing the Total Value of national Exports by the population (**Ministry of Agriculture and Land Reclamation, 2022**).

Average per capita Exports = (Value Fish Exports / population)

### 5- Dependency Rate:

The Dependency Rate refers to the country's rate of Dependence on the outside world, is equal to dividing the Value of the country's Imports by the value of the country's national income (**Soliman, 2016**).

Dependency Rate % = (Value Fish Imports/ Value Fish Income) × 100

### 6- Coverage Rate:

This Rate refers to the ratio of the Value of Exports to the Value of Imports, the extent to which the state controls its Imports and the purchasing power of its Exports. It is obtained by dividing the value of Exports by the value of Imports(**Soliman, 2016**).

Coverage Rate % = (Value Fish Exports/ Value Fish Imports) × 100

### 7- Export Efficiency Index:

The Export Efficiency Index is used to compare foreign and Domestic Markets, as it shows

whether the Export Price is higher than the selling price in the local Market and vice versa, which indicates the possibility and necessity of opening Export Markets or there is no need for that, as the high Export Efficiency is an incentive for Exporters to increase Profits, the Value of Exports of the Exported commodity is transferred to its equivalent in the domestic currency (LE) according to the exchange rate and is attributed to its Value at Domestic Wholesale Prices. If the percentage is more than 100%, this means that the commodity is sold in the foreign Market at higher Prices than the Market Domestic and vice versa (**Mohamed, 2018**).

Export Efficiency = (Value Commodity at Export Prices / Value Commodity at Wholesale Prices) × 100

### SOURCES OF DATA COLLECTION:

The research relied on published and unpublished secondary data from its various sources, such as data from the Economic Affairs Sector of the Ministry of Agriculture, publications and yearbooks from the Central Agency for Public Mobilization and Statistics, the International Trade Center trade map database, in addition to studies and research related to the field of research.

### RESULTS AND DISCUSSION:

#### First: Evolution Value of Foreign Trade in Egyptian Fish during the period (2001-2021):

##### 1- Evolution Value of Egyptian Fish Exports:

Table (1) indicates the development of the value of Egyptian foreign Fish Trade in million dollars during the period (2001-2021). From it, it was found that the average value of Egyptian Fish Exports during the period (2001-2010) amounted to about 6.09 million dollar, with an annual growth rate of about 28%. Then, the average value of Fish Exports increased to about 34.47 million dollar, at an annual growth rate of about 8%, during the period (2011-2021). In general, the value of Egyptian Fish Exports ranged between a minimum of about 1.25 million dollar in 2001, a maximum of about 52.60 million dollar in 2019, with an annual average of about 20.95 million dollar, an annual growth rate of about 19%, during the period (2001-2021).

##### 2- Evolution Value of Egyptian Fish Imports:

It is clear from Table (1). The average value of Egyptian Fish Imports during the period (2001-

2010) amounted to about 171.04 million dollar, with an annual growth rate of about 15%. Then, the average value of Fish Imports increased to about 578.23 million dollar, at an annual growth rate of about 3%, during the period (2011-2021). In general, the value of Egyptian fish Imports ranged between a minimum of about 61.17 million dollar in 2003, a maximum of about 849.17 million dollar in 2019, with an annual average of about 384.33 million dollar and an annual growth rate of about 9%, during the period (2001-2021).

### 3- Evolution Value of Egyptian Foreign Fish Trade:

It is clear from Table (1). The average value of Egyptian foreign Fish Trade during the period (2001-2010) amounted to about 177.11 million dollar, with an annual growth rate of about 16%. Then, the average value of Fish Trade increased to about 612.70 million dollar, at an annual growth rate of about 3%, during the period (2011-2021).

**Table 1.** Value of Egyptian Foreign Fish Trade in Million Dollar during the period (2001-2021)

Year	Exports	Imports	Trade Value	Fish Balance
2001	1.25	92.16	93.41	(90.91)
2002	2.22	65.03	67.25	(62.81)
2003	2.85	61.17	64.02	(58.31)
2004	3.26	97.73	100.99	(94.47)
2005	3.97	90.45	94.42	(86.48)
2006	3.36	104.32	107.68	(100.96)
2007	4.45	166	170.45	(161.55)
2008	10.82	269.68	280.49	(258.86)
2009	13.49	377.96	391.45	(364.47)
2010	15.00	385.91	400.91	(370.91)
<b>Average</b>	6.09	171.04	177.11	(164.97)
<b>annual growth rate</b>	28%	15%	16%	15%
2011	23.36	403.17	426.53	(379.82)
2012	18.24	531.69	549.93	(513.45)
2013	23.59	434.57	458.15	(410.98)
2014	31.05	562.32	593.36	(531.27)
2015	29.49	559.90	589.40	(530.41)
2016	43.24	479.09	522.33	(435.84)
2017	36.56	567.34	603.90	(530.78)
2018	33.08	727.41	760.48	(694.33)
2019	52.6	849.17	901.78	(796.57)
2020	35.81	692.62	728.43	(656.81)
2021	52.18	553.21	605.39	(501.03)
<b>Average</b>	34.47	578.23	612.7	(543.75)
<b>annual growth rate</b>	8%	3%	3%	3%
<b>Average</b>	20.95	384.33	405.27	(363.38)
<b>annual growth rate</b>	19%	9%	9%	8%

Values in brackets are negative.

Source: ITC database. <https://www.trademap.org>

In general, the value of Egyptian Trade in Fish Products ranged between a minimum of about 64.02 million dollar in 2003, a maximum of about 901.79 million dollar in 2019, with an annual average of about 405.27 million dollar and an annual growth rate of about 9%, during the period (2001-2021).

#### **4- Evolution Value of the Egyptian Fish Balance:**

It is clear from Table (1). There is a deficit in the Fish Balance throughout the study period, as the average value of the deficit in the Egyptian Fish Balance during the period (2001-2010) amounted to about 164.97 million dollar, with an annual growth rate of about 15%. Then, the average value of the deficit in the fish balance increased to about 543.75 million dollar, at an annual growth rate of about 3%, during the period (2011-2021). In general, the value of the Fish Balance ranged between a minimum of about 58.31 million dollar in 2003, a maximum of about 796.57 million dollar in 2019, with an annual average of about 363.33 million dollar and an annual growth rate of about 8%, during the period (2001-2021), due to the higher Import bill than Exports.

#### **Second: Evolution Per Capita share of Egyptian Fish Exports and Imports and some indicators of Foreign Trade during the period (2001-2021):**

##### **1- Evolution Average Per Capita Value of Egyptian Fish Exports:**

Table (2) indicates the development of the Per Capita share of Egyptian Fish Exports, Imports and some indicators of foreign trade during the period (2001-2021). It turns out that average per capita share of the value of Egyptian Fish Exports is very low, reaching during the period (2001-2010) about 0.08 dollar, with an annual growth rate of about 26%. Then the average Per Capita value of Fish Exports increased to about 0.37 dollar, at an annual growth rate of about 5%, during the period (2011-2021). The general average per capita value of Egyptian fish exports amounted to about 0.23 dollar, with an annual growth rate of about 17%, during the period (2001-2021).

##### **2- Evolution Average Per Capita Value of Egyptian Fish Imports:**

It is clear from Table (2). The average Per Capita share of the value of Egyptian Fish Imports is greater than the average Per Capita share of the value of Fish Exports, as it reached about 2.31 dollar during the period (2001-2010), with an

annual growth rate of about 13%. Then the average Per Capita value of Fish Imports increased to about 6.27 dollar, at an annual growth rate of about 1%, during the period (2011-2021). The general average Per Capita value of Egyptian Fish Imports amounted to about 4.38 dollar, with an annual growth rate of about 7%, during the period (2001-2021).

##### **3- Evolution of Egyptian Fish Imports Coverage Rate of Exports:**

It is clear from Table (2). The rate of coverage of Egyptian Fish Imports by Exports during the period (2001-2010) amounted to about 3.45%, with an annual growth rate of about 11%. Then the coverage rate increased to about 6.02%, with an annual growth rate of about 5%, during the period (2011-2021). The general average rate of coverage of Egyptian Fish Imports by Exports was about 5.45%, with an annual growth rate of about 10%, during the period (2001-2021).

##### **4- Evolution of Egypt's rate of Fish dependence on the outside World:**

It is clear from Table (2). The rate of Egypt's dependence on Fish to the outside world during the period (2001-2010) amounted to about 10.16%, with an annual growth rate of about 9%. Then the dependency rate increased to about 21.92%, with an annual growth rate of about 4%, during the period (2011-2021). The general average rate of Egypt's dependence on fish to the outside world was about 16.32%, with an annual growth rate of about 6%, during the period (2001-2021).

#### **Third: Evolution Value of Foreign Trade in Egyptian Fish Products during the period (2001-2021):**

##### **1- Evolution Value Exports of Egyptian Fish Products:**

By studying the contribution of different types of Fish Products to Exports, it was found that Fresh or Chilled Fish came in the first place, with a value of about 13.43 million dollar and a relative importance of about 64.13% and an annual growth rate of 21%. Crustaceans came in second place, with a value of about 3.08 million dollar and a relative importance of about 14.69% and an annual growth rate of 50%, Then came Mollusks, Live Fish, Frozen Fish, Treated or Smoked Fish, Fish Fillets, Aquatic invertebrates, With a value of about 1.61, 1.51, 0.76, 0.44, 0.12, 0.002 million dollar, respectively, with a relative importance of about 7.70%, 7.22%, 3.63%, 2.08%, 0.55%, 0.01%, respectively, with an annual growth rate of 4%, 4%, 23%, 12%, 10%, 0% respectively in Table (3).



**Table 2.** Evolution Per Capita share of Egyptian Fish Exports, Imports and some indicators of Foreign Trade during the period (2001-2021)

Year	Average Per Capita Value of Exports (Dollar)	Average Per Capita Value of Imports (Dollar)	Coverage Rate (%)	Dependency Rate (%)
2001	0.02	1.41	1.36	6.67
2002	0.03	0.98	3.42	5.20
2003	0.04	0.90	4.66	5.87
2004	0.05	1.41	3.34	8.99
2005	0.06	1.28	4.39	7.37
2006	0.05	1.45	3.22	7.02
2007	0.06	2.26	2.68	9.45
2008	0.14	3.58	4.01	14.88
2009	0.18	4.92	3.57	19.72
2010	0.19	4.90	3.89	16.42
<b>Average</b>	0.08	2.31	3.45	10.16
<b>annual growth rate</b>	26%	13%	11%	9%
2011	0.29	5.01	5.79	15.60
2012	0.22	6.44	3.43	20.04
2013	0.28	5.13	5.43	16.70
2014	0.36	6.48	5.52	19.61
2015	0.33	6.29	5.27	20.33
2016	0.48	5.26	9.03	16.13
2017	0.38	5.96	6.44	24.61
2018	0.34	7.49	4.55	29.06
2019	0.53	8.59	6.19	25.3
2020	0.36	6.88	5.17	30.69
2021	0.51	5.42	9.43	18.84
<b>Average</b>	0.37	6.27	6.02	21.92
<b>annual growth rate</b>	5%	1%	5%	4%
<b>Average</b>	0.23	4.38	5.45	16.32
<b>annual growth rate</b>	17%	7%	10%	6%

Source: Collected and calculated from Table No. (1) in the research and Tables (1), (2) in the appendices.

By studying the Commodity Concentration Coefficient for Egyptian Exports of Fish Products, which amounts to about 66.76%, which indicates that Egypt depends on Exports by more than 78% on two commodities, which are fresh or chilled fish and crustaceans It also relies on Export by more than 85% on three Products, namely Fresh or Chilled Fish, Crustaceans, Mollusks, which indicates the need to diversify and increase the quantity of exported products to make the most of all products and avoid any changes in consumer tastes in Table (3).

## 2- Evolution value Imports of Egyptian Fish Products:

By studying the contribution of different types of Fish Products to Imports in Table (3), it was found that Frozen Fish came in the first place with a value of about 271.12 million dollar and a relative importance of about 70.54% and an annual growth rate of 7%. Crustaceans came in second place with a value of

about 69.91 million dollar and a relative importance of about 18.19% and an annual growth rate of 27%. Then came Fish Fillets, Mollusks, Fresh or Chilled Fish, Treated or Smoked Fish, Live Fish, with a value of about 25.80, 15.77, 1.03, 0.43, 0.27 million dollar, respectively, with a relative importance of about 6.71, 4.10%, 0.27%, 0.11%, 0.07%, respectively, an annual growth rate of 11%, 22%, 13%, 2%, respectively, except for fresh or chilled fish, with a decreasing annual growth rate of about 5%.

By studying the Commodity Concentration Coefficient for Egyptian Imports of Fish Products, which amounts to about 73.28%, which indicates that Egypt depends on Imports by more than 70% on one commodity, which is Frozen Fish, due to its low prices, It also relies on Imports by more than 95% on three Products, which are Frozen Fish, Crustaceans and Fish Fillets in Table (3).





**Table 3.** Evolution Value of Exports, Imports, Annual Growth Rate and Coverage of Fish Products in million dollar during the period (2001-2021)

Statement	Export value			Import value			coverage Rate %
	Value	%	annual growth rate	Value	%	annual growth rate	
Fresh or Chilled Fish	13.43	64.13	21	1.03	0.27	(5)	1307.68
Crustaceans	3.08	14.69	50	69.91	18.19	27	4.40
Mollusks	1.61	7.70	4	15.77	4.10	22	10.23
Live Fish	1.51	7.22	4	0.27	0.07	2	554.13
Frozen Fish	0.76	3.63	23	271.12	70.54	7	0.28
Treated or Smoked Fish	0.44	2.08	12	0.43	0.11	13	101.06
Fish Fillets	0.12	0.55	10	25.80	6.71	11	0.45
Aquatic Invertebrates	0.002	0.01	-	0.00	-	-	-
<b>Total</b>	<b>20.95</b>	<b>100</b>	<b>19</b>	<b>384.33</b>	<b>100</b>	<b>6</b>	<b>5.45</b>
<b>Commodity Concentration Coefficient %</b>	<b>66.76</b>			<b>73.28</b>			

Values in brackets are negative.

- Fresh or chilled fish, except for fish fillets and other fish mentioned.
- Crustaceans, whether or not shelled, live, fresh, chilled, frozen, dried, salted, in brine, smoked.
- Mollusks, whether or not shelled, live, fresh, chilled, frozen, dried, salted, in brine.
- Frozen fish, except fillets and other fish meat.
- Processed or smoked fish includes dried, salted, in brine, smoked fish, whether cooked or during the smoking process.
- Fish fillets and other fish meat, whether or not minced, fresh, frozen or chilled.
- Aquatic invertebrates, except for the aforementioned fish.

Source: ITC database. <https://www.trademap.org>

### 3- Evolution Rate of coverage of Exports to Imports of Fishery Products:

By studying the Rate of Export Coverage of Egyptian Imports of Fish Products during the period (2001-2021) has been shown in Table (3). There is a group of Products who's Exports Cover their Imports, which are Fresh or Chilled Fish, Live Fish, Treated or Smoked Fish, with rates amounting to about 1307.68%, 554.13%, 101.06% respectively. It was also found that there are products with a very large deficit, which are Mollusks, Crustaceans, Fish Fillets, Frozen Fish, at rates of about 10.23%, 4.40%, 0.45%, 0.28% respectively. This indicates that this deficit must be compensated for by increasing Exports of high-priced fish products in Table (3).

### 4- Evolution trade value of Egyptian Fish Products:

By studying of the contribution of different types of fish products to the value of trade, it was found that Frozen Fish came in the first place with a value of about 271.88 million dollar and a relative importance of about 67.08% and an annual growth rate of 7%. Crustaceans came in second place with a value of about 72.99 million dollar and a

relative importance of about 18.01% and an annual growth rate of 28%. Then came Fish Fillets, Mollusks, Fresh or Chilled Fish, live Fish, Treated or Smoked Fish, Aquatic Invertebrates, With a value of about 25.91, 17.38, 14.46, 1.79, 0.87, 0.002 million dollar, respectively, with a relative importance of about 6.39%, 4.29%, 3.57%, 0.44%, 0.21%, 0%, respectively, with an annual growth rate of 11%, 19%, 13%, 3%, 12%, 0%, respectively, in Table (4).

### 5- Evolution of the value Balance of Egyptian Fish Products:

By studying the contribution of different types of fish products to the value of fish balance, it was found that Frozen Fish comes first with a value of about 270.36 million dollar and a relative importance of about 74.40% and an annual growth rate of 7%. Crustaceans came in second place, with a value of about 66.84 million dollar and a relative importance of about 18.39%, with an annual growth rate of 26%, Then came slices of Fish and Mollusks, with a value of 25.68, 14.16 million dollar, respectively, with a relative importance of 7.07%, 3.90%, respectively, with an annual growth rate of 11%, 22%.

**Table 4.** Evolution of the Value foreign Trade, Fish Balance and Annual Growth Rate of Fish Products in Million Dollar during the period (2001-2021)

Statement	Trade Value			Fish Balance		
	Value	%	Annual Growth Rate	Value	%	Annual Growth Rate
Fresh or Chilled fish	14.46	3.57	13	12.405	(3.41)	16
Crustaceans	72.989	18.01	28	(66.836)	18.39	26
Mollusks	17.379	4.29	19	(14.155)	3.9	22
Live Fish	1.785	0.44	3	1.239	(0.34)	5
frozen Fish	271.878	67.08	7	(270.358)	74.4	7
Treated or Smoked Fish	0.867	0.21	12	0.005	0.00	2
Fish fillets	25.914	6.39	11	(25.683)	7.07	11
aquatic invertebrates	0.002	0.00	0	0.002	0.00	0
<b>Total</b>	<b>405.274</b>	<b>100</b>	<b>9%</b>	<b>(363.38)</b>	<b>100</b>	<b>8</b>

**Values in brackets are negative,** Annual growth rate was calculated when the time series was regular.

**Source:** ITC database. <https://www.trademap.org>

was also found that there are some Products that have a commercial surplus, which are Fresh or Chilled Fish, Live Fish, Treated or Smoked Fish, Aquatic Invertebrates with a value of about 12.41, 1.24, 0.005, 0.002 million dollar, respectively, a relative importance of about -3.41%, -0.34%, 0%, 0%, respectively, an annual growth rate of 16%, 5%, 2%, 0%, respectively, in Table (4).

#### **Fourth: Geographical Distribution of the most important Egyptian Export and Import Markets for Fish Products during the period (2001-2021):**

##### **1- Geographical Distribution of the most important Export Markets for Egyptian Fish Products:**

By studying the most important Export Markets for Fish Products, it is shown in Table (5). The most important countries importing Egyptian Fish during the period (2001-2021) amounted to about 14 Countries, representing a relative importance of about 91.83%, as Italy ranked first in terms of countries importing from Egypt, with a value of about 3.43 million dollar, With a relative importance of about 16.35%, with an annual growth rate of about 16%, Saudi Arabia came in second place, with a value of about 2.58 million dollar, with a relative importance of 12.30%, an annual decreasing rate of 5%, While the State of Lebanon ranked third with a value of 2.41 million dollar, with a relative importance of about 11.51%, with an annual rate of decrease of about 3%, the UAE ranked fourth with a value of about 2.30 million dollar, with a relative importance of about 10.99%, an annual growth rate of about 36%, The USA ranked fifth, with a value of about 1.91 million dollar, with a relative importance of about 9.10%, an annual growth rate of about 97%, Then came from the sixth to the fourteenth place each of Israel, Kuwait, Jordan, China, Cyprus, Greece, Spain, Qatar, France, with a

value of about 1.62, 1.38, 0.92, 0.57, 0.49, 0.45, 0.43, 0.40, 0.38 million dollar, respectively, with a relative importance of about 7.69%, 6.57%, 4.37%, 2.71%, 2.35%, 2.13%, 2.06%, 1.89%, 1.81%, respectively, at an annual growth rate of about 22%, 24%, 3%, 14%, -7%, 20%, 23%, -6%, 113%, respectively, The value of the rest of the countries amounted to about 1.71 million dollar, with a relative importance of about 8.17%, an annual growth rate of about 18%.

By studying the most important Export Markets for Fish Products, it is shown in Table (5). the Geographical Concentration Coefficient for the value of Egyptian Exports of Fish Products, it is shown in Table (5). The value of Egyptian Exports of fish products was characterized by a decrease in the Geographical Concentration Coefficient of 40% during the period (2001-2021), when it reached about 31.17%, where more than 50% of the value of exports concentrated on four countries, namely Italy, Saudi Arabia, Lebanon, UAE, more than 78% of the value of exports concentrated on 8 countries, namely Italy, Saudi Arabia, Lebanon, UAE, America, Israel, Kuwait and Jordan, This indicates that the geographical scope of Egypt's exports is somewhat diversified, this coefficient can be reduced further by opening new export markets to avoid risks that may occur, such as countries' reluctance to Import from Egypt or any changes that occur, Especially Political, Climatic, Economic and social changes, thus a decrease in the return on foreign exchange, as the value is close to 40%.

##### **2- Geographical Distribution of the most important Import Markets for Fish Products:**

By studying the most important Import Markets for Fish Products, it is shown in Table (5). The

most important countries exporting Fish products to Egypt during the period (2001-2021) are about 14 Countries, representing a relative importance of about 84.17%, She Netherlands ranked first in terms of exporting countries to Egypt, with a value of about 92.92 million dollar, with a relative importance of about 24.18%, and an annual growth rate of about 9%, Norway came in second place, with a value of about 36.57 million dollar, with a relative importance of 9.52%, with an annual growth rate of 1%, while the UAE came in third place with a value of 35.08 million dollar, with a percentage importance of about 9.13%, an annual growth rate of about 19%, Vietnam ranked fourth, with a value of about 31.29 million dollar, with a relative importance of about 8.14%, an

annual growth rate of about 28%, Japan ranked fifth, with a value of about 23.01 million dollar, with a relative importance of about 5.99%, an annual growth rate of about 23%, Then came from the sixth to the fourteenth place each of Spain, China, Yemen, Ireland, Brazil, Oman, India, Britain, Iceland, with a value of about 19.99, 18.00, 13.34, 13.04, 11.25, 8.72, 7.16, 6.77, 6.36 million dollars, respectively, with a relative importance of about 5.20%, 4.68%, 3.47%, 3.39%, 2.93%, 2.27%, 1.86%, 1.76%, 1.65%, respectively, At an annual growth rate of about 20%, 16%, 22%, 25%, 3%, 11%, 26%, 12%, -0.11%, respectively, the value of the rest of the countries amounted to about 60.82 million dollar, with a relative importance of about 15.83%, and an annual growth rate of about 15%.

**Table 5.** Geographical Distribution of the most important Egyptian Export and Import Markets for Fish Products in million Dollar during the period (2001-2021)

Countries	Export Value			Countries	Import Value		
	Value	%	Annual Growth Rate		Value	%	Annual Growth Rate
Italy	3.43	16.35	16	Netherlands	92.92	24.18	9
Saudi Arabia	2.58	12.3	(5)	Norway	36.57	9.52	1
Lebanon	2.41	11.51	(3)	UAE	35.08	9.13	19
UAE	2.30	10.99	36	Vietnam	31.29	8.14	28
USA	1.91	9.10	97	Japan	23.01	5.99	23
Israel	1.61	7.69	22	Spain	19.99	5.20	20
Kuwait	1.38	6.57	24	China	18.00	4.68	16
Jordan	0.92	4.37	3	Yemen	13.34	3.47	22
China	0.57	2.71	14	Ireland	13.04	3.39	25
Cyprus	0.49	2.35	(7)	Brazil	11.25	2.93	3
Greece	0.45	2.13	20	Oman	8.72	2.27	11
Spain	0.43	2.06	23	India	7.16	1.86	26
Qatar	0.40	1.89	(6)	Britain	6.77	1.76	12
France	0.38	1.81	113	Iceland	6.36	1.65	(0.11)
Other	1.71	8.17	18	other	60.82	15.83	15
<b>Total</b>	<b>20.95</b>	<b>100</b>	<b>19</b>	<b>Total</b>	<b>384.33</b>	<b>100</b>	<b>6</b>
<b>Geographical concentration Coefficient %</b>	<b>31.17</b>			<b>34.74</b>			

Values in brackets are negative, Annual growth rate was calculated when the time series was regular.

Source: ITC database. <https://www.trademap.org>

By studying the Geographical Concentration Coefficient of the value of Egyptian Imports of Fish Products, it is shown in Table (5). The value of Egyptian Imports of Fish Products was characterized by a decrease in the Geographical Concentration Coefficient for them from 40% during the period (2001-2021), when it reached about 34.74%, Where more than 50% of the value of imports concentrated on four countries, namely the Netherlands, Norway, UAE, Vietnam, more

than 70% of the value of imports concentrated on 8 countries, namely the Netherlands, Norway, UAE, Vietnam, Japan, Spain, China, Yemen, his indicates that the geographical scope of Egypt's imports is somewhat diversified, this coefficient can be reduced further by opening new import markets to avoid risks that would affect food security, such as countries' reluctance to Export to Egypt as a result of any changes that occur,

Especially Political, Social, Economic and Climatic Changes, as the value is close to 40%.

**Fifth: Production, Consumption and Economic indicators of Fish Production in Egypt (2001-2021):**

**1- Domestic Production:**

Table (6) indicates the evolution of the amount of Domestic Production available for consumption, gap, self-sufficiency rate, income from the fishery sector during the period (2001-2021). From it, it is clear that the amount of Fish Production in Egypt during the period (2001-2010) amounted to about 964.72 thousand ton, with an annual growth rate of about 5%. Then, the amount of Fish Production increased to about 1700.49 thousand ton, at an annual growth rate of about 4%, during the period (2011-2021). the general average amount of domestic fish production amounted to about 1350.12 thousand ton, with an annual growth rate of about 5%, during the period (2001-2021).

**2- Available Consumption:**

It is clear from Table (6). The amount Available for Consumption of Fish Production in Egypt during the period (2001-2010) amounted to about 1156.87 thousand ton, with an annual growth rate of about 4%. Then the amount available for consumption of fish production increased to about 2015.55 thousand ton, at an annual growth rate of about 3%, during the period (2011-2021). The general average amount of Fish Available for Consumption was about 1606.65 thousand ton, with an annual growth rate of about 4%, during the period (2001-2021).

**3- Fish Gap:**

It is clear from Table (6). The amount of Fish Gap in Egypt during the period (2001-2010) amounted to about 192.16 thousand ton, with an annual decrease rate of about 1%. Then, the amount of Fish Gap increased to about 315.05 thousand ton, at an annual growth rate of about 2%, during the period (2011-2021). The general average amount of Fish Gap was about 256.53 thousand ton, with an annual decrease rate of about 1%, during the period (2001-2021).

**4- Self-sufficiency Rate%:**

It is clear from Table (6). The percentage of Self-sufficiency in Fish in Egypt during the period (2001-2010) amounted to about 83.25%, with an annual growth rate of about 1%. Then, the Self-sufficiency rate increased to about 84.61%, at an

annual growth rate of about 0.11%, during the period (2011-2021). The general average of Self-sufficiency in fish was about 83.96%, with an annual growth rate of about 1%, during the period (2001-2021).

**5- Income from the fisheries sector:**

It is clear from Table (6). Income from the fisheries sector in Egypt during the period (2001-2010) amounted to about 1531.10 million dollar, with an annual growth rate of about 5%. Then, fish income increased to about 2659.18 million dollar, at an annual growth rate of about -1%, during the period (2011-2021). The general average of fish income amounted to about 2122.00 million dollar, with an annual growth rate of about 3%, during the period (2001-2021).

**6- Export Efficiency:**

It is clear from Table (6). The Export Efficiency of fish production in Egypt during the period (2001-2010) amounted to about 55.57%, with an annual decrease rate of about 1%. Then the Export Efficiency decreased to about 46.97%, at an annual rate of decrease of about 12%, during the period (2011-2021). The general average of Export Efficiency was about 51.07%, with an annual decrease rate of about 5%, during the period (2001-2021).

**Sixth: most important variables affecting Egyptian Fish Imports during the period (2001-2021):**

By studying the impact of the most important variables on Egyptian Imports of fish during the period (2001-2021) using simple linear regression between the variables in order to avoid falling into the problem of double linearity or auto-correlation between the variables, especially since most of these variables have auto-correlation, the stepwise regression method was also used for the variables clustered, It was distributed into three categories, the first category variables related to the commodity (Import Price, Fish Gap, Self-sufficiency Ratio), the second category variables related to competing or alternative commodities (Size Gap of Red Meat, Size Gap of Poultry Meat, Retail Price of Red Meat, Retail Price of Poultry Meat), the third category variables related to consumption or the consumer (population, Average per capita Consumption of Fish, Average Per Capita National Income) where it was found:

**Table 6.** Evolution of the Quantity of Domestic Production, Available Consumption, Gap, Percentage self-sufficiency and Income from the fish sector during the period (2001-2021)

Year	Domestic Production 1000 ton	Available Consumption 1000 ton	Fish Gap 1000 ton	Self-sufficiency rate%	Fish Income Million dollar	% Export Efficiency
2001	771.18	1031.70	260.52	74.75	1382.12	69.50
2002	801.40	953.30	151.90	84.07	1251.56	60.23
2003	876.02	1035.87	159.85	84.57	1041.54	80.71
2004	865.03	1083.93	218.90	79.80	1087.42	36.51
2005	889.30	1072.40	183.10	82.93	1228.03	63.09
2006	970.92	1174.44	203.52	82.67	1484.99	48.99
2007	1008.01	1262.50	254.49	79.84	1756.03	45.90
2008	1067.63	1197.70	130.07	89.14	1812.71	45.11
2009	1092.89	1205.90	113.01	90.63	1916.97	45.52
2010	1304.80	1551.00	246.20	84.13	2349.64	60.13
<b>Average</b>	964.72	1156.87	192.16	83.25	1531.10	55.57
<b>annual growth rate</b>	5%	4%	(1%)	1%	5%	(1%)
2011	1362.17	1535.00	172.83	88.74	2583.64	86.65
2012	1371.98	1691.00	319.02	81.13	2653.63	40.26
2013	1454.40	1670.00	215.60	87.09	2602.04	35.82
2014	1481.88	1808.00	326.12	81.96	2866.95	33.95
2015	1518.94	1790.00	271.06	84.86	2754.10	27.83
2016	1706.30	1970.00	263.70	86.61	2970.09	55.42
2017	1823.47	2154.00	330.53	84.66	2304.89	49.05
2018	1934.74	2233.00	298.26	86.64	2503.15	60.33
2019	2038.99	2510.00	471.01	81.23	3356.29	59.01
2020	2010.58	2582.00	571.42	77.87	2256.79	46.24
2021	2001.96	2228.00	226.04	89.85	2399.36	22.15
<b>Average</b>	1700.49	2015.55	315.05	84.61	2659.18	46.97
<b>annual growth rate</b>	4%	3%	2%	0.11%	(1%)	(12%)
<b>Average</b>	1350.12	1606.65	256.53	83.96	2122.00	51.07
<b>annual growth rate</b>	5%	4%	(1%)	1%	3%	(5%)

The values in brackets are negative

Source:

- Lakes and Fish Resources Protection and Development Authority (formerly the General Authority for Fish Resources Development), **Fish Statistical Year book**, separate issues.
- Central Agency for Public Mobilization and Statistics, **Annual Bulletin of the Movement of Production, Foreign Trade, and Available for Consumption of Agricultural Commodities**, separate issues.
- Central Agency for Public Mobilization and Statistics, **Annual Bulletin of Prices for Foodstuffs, Products, and Services (Producer/Wholesale/Consumer)**, separate issues.

**1- First category is commodity-specific variables:**

It is clear from Table (7) and equation (1) and (2) that an increase in the Import price about 10% leads to a decrease in the value of Egyptian imports by about 8.30%, an increase in the Fish Gap about 10% leads to an increase in the value of Egyptian Imports by about 10.40%. These results were consistent with the Economic logic and statistically significant, while the statistical significance of the self-sufficiency ratio did not prove equation (3).

**2- Second category is variables related to competing or alternative commodities:**

It is clear from Table (7) and equation (4), (5), (6), (7) that an increase in the Red Meat Gap about 10% leads to an increase in the value of Egyptian

Imports about 6.70%, an increase in the Gap in Poultry meat by about 10% leads to an increase in the value of Egyptian Imports about 4.20%, An increase in the retail price of Red Meat about 10% leads to an increase in the value of Egyptian imports about 11.20%, an increase in the retail price of poultry meat by about 10% leads to an increase in the value of Egyptian imports about 13.20%. These results were consistent with the economic reasoning and statistically significant.

**3- third category is variables related to consumption or the consumer:**

It is clear from Table (7) and equations (8), (9), (10) that an increase in the population by about 10% leads to an increase in the value of Egyptian Imports about 40%, Increasing the average per capita consumption of fish by about

10% leads to an increase in the value of Egyptian imports by about 30.20%, Increasing the average per capita share of national income by about 10% leads to an increase in the value of Egyptian imports by about 21%. These results were consistent with the Economic reasoning and statistically significant.

By studying the variables that most affect the value of Egyptian Fish Imports using stepwise regression for the variables grouped in Table (7) equation (11), it turns out that the most influential variables on the value of Egyptian Fish Imports are the population, and the Fish Gap, where an

increase in the population by one million inhabitants leads to an increase in the value of Egyptian Fish Imports about 11.82 million dollars. The increase in the Egyptian Fish Gap also leads to an increase in the value of Imports about 0.71 million dollar. The value of the Adjusted R Square was about 0.94, which indicates that about 94% of the changes in the value of Egyptian Fish Imports are attributed to the change in the variables included in the relationship. The calculated F value (109.23)\*\* indicates the extent to which the model used matches the nature of the data under study.

**Table 7.** Most important variables affecting the value of Egyptian Fish Imports during the period (2001-2021)

S	independent variables	$\hat{Y}_i = a \pm b X$	R <sup>2</sup>	F	Regression value	Elasticity
1	Per Ton Import Price (thousand dollar)	$\hat{Y}_i = -943.75 + 2531.45x_{i1}$ (-3.55)** (3.76)** $-1279.78x_{i2} + 192.14x_{i3}$ (-2.79)* (2.07)	0.79	23.98**	(207.5)	(0.83)
2	Fish Gap (thousand ton)	$\hat{Y}_i = -12.10 + 1.55x_{i1}$ (-0.12) (4.17)**	0.45	17.42**	1.55	1.04
3	% Self-sufficiency	$\hat{Y}_i = -16.77 + 5.06x_{i1}$ (-0.96) (1.29)	0.03	1.66	5.06	N.S
4	Gap Red Meat (thousand ton)	$\ln \hat{Y}_i = 1.84 + 0.67 \ln x_{i1}$ (1.77) (2.44)*	0.20	5.98*	0.70	0.67
5	Gap Poultry Meat (thousand ton)	$\ln \hat{Y}_i = 4.48 + 0.42 \ln x_{i1}$ (29.51)** (9.29)**	0.81	86.28**	3.82	0.42
6	Retail Price Red Meat (LE/Kg)	$\ln \hat{Y}_i = 1.89 + 1.12 \ln x_{i1}$ (2.99)** (11.45)**	0.87	131.03**	6.22	1.12
7	Retail Price Poultry Meat (LE/Kg)	$\ln \hat{Y}_i = 2.07 + 1.32 \ln x_{i1}$ (7.65)** (13.60)**	0.90	184.81**	26.40	1.32
8	Population (million inhabitants)	$\hat{Y}_i = -1181.15 + 19.06x_{i1}$ (-8.60)** (11.51)**	0.87	132.39**	19.06	4.00
9	Average Per Capita Consumption (kg/year)	$\hat{Y}_i = -781.30 + 60.42x_{i1}$ (-6.62)** (10.04)**	0.83	100.81**	60.42	3.02
10	Average Per Capita National Income (thousand dollar)	$\ln \hat{Y}_i = 3.13 + 2.10 \ln x_{i1}$ (28.35)** (11.89)**	0.88	141.38**	210.00	2.10
Most influential factors using Stepwise Regression						
11	x <sub>1</sub> population x <sub>2</sub> Gap of Fish	$\hat{Y}_i = -923.96 + 11.82x_{i1} + 0.71x_{i2}$ (-8.54)** (6.29)** (3.82)**	0.94	109.23**	-	-

Values in brackets are negative. Elasticity = Regression value x (Mean Independent Variable / Mean Dependent Variable)

Source: Collected and calculated from Table (1) in the Appendix.

**Seventh: most important variables affecting Egyptian Fish Exports during the period (2001-2021):**

By studying the impact of the most important variables on Egyptian Exports of Fish during the period (2001-2021) using simple linear regression between variables, this is to avoid falling into the problem of double linearity or self-correlation between the variables, especially since most of these variables have self-correlation, the stepwise regression method was also used for the variables clustered. It was distributed into two categories, the first category is variables related to the Egyptian commodity (Domestic Production, Export Price, Exchange Rate), the second category is variables related to the Imports of the most important importing countries from Egypt

(Lebanon, Saudi Arabia, Kuwait, Italy, USA, Israel, Jordan, UAE), especially Fresh or Chilled Fish, in addition to the Average Per Capita National Income and population of the aforementioned Countries, as it was found:

**1- First category is variables specific to the Egyptian Commodity:**

It is clear from Table (8) and equation (12), (14) that an increase in the Price of Domestic Fish Production about 10% leads to an increase in the value of Egyptian Fish Exports about 22.30%, In addition, an increase in the dollar exchange rate about 10% leads to an increase in the value of Egyptian Exports about 11.80%. These results

were consistent with the Economic logic and statistically significant, while the statistical significance of the Export price did not prove equation (13).

**2- Second category is variables related to the Imports of the most important importing Countries from Egypt:**

It is shown from Table (8) and equation (15), (16), (17), (18), (19), (20), (21), (22), which are related to the total Imports of the most important importing Countries from Egypt, especially in fresh and chilled Fish Products, an Increase in the Imports of Lebanon, Saudi Arabia, Kuwait, Italy, USA, Israel, Jordan, UAE about 10% leads to an increase in the value of Egyptian Fish Exports about 18.50%, 25.60%, 7.60%, 34.80%, 21.30%, 8.40%, 14.80%, 5.60%, respectively. These results were consistent with the economic reasoning and statistically significant.

As shown in Table (8) and equation (23), (24), (25), (26), (27), (28), (29), (30) pertaining to the Average Per Capita National Income for each Country, That by increasing the Average Per Capita share of National Income in Lebanon, Saudi Arabia, Kuwait, UAE, Italy, USA, Israel and Jordan by about 10% leads to an increase in the value of Egyptian Exports of Fish about 35.70%, 30.50%, 18.40%, 58.80%, 41.80%, 41.90%, 38.20, 36.30%, respectively, these results were consistent with the economic reasoning and statistically significant.

As shown in Table (8) and equation (31), (32), (33), (34), (35), (36), (37), (38) regarding the population of each Country, That the increase in the population of Lebanon, Saudi Arabia, Kuwait, the UAE, Italy, USA, Israel, Jordan.

About 1% leads to an increase in the value of Egyptian Fish Exports about 8.40%, 6.99%, 3.98%, 3.06%, 51.48%, 23.62%, 9.61%, 4.11%, respectively. These results were consistent with the Economic reasoning and statistically significant.

By studying the variables that most affect the value of Egyptian fish exports using stepwise regression for the variables grouped in Table (8) equation (39), it turns out that the most influential variables on the value of Egyptian Fish Exports are the population of Saudi Arabia, Saudi Imports of Fresh and Chilled Fish, as an increase in the population of Saudi Arabia about 10% leads to an increase in the value of Egyptian Fish Exports about 50.50%. Increasing Saudi imports of Fresh and Chilled Fish about 10% will lead to an increase in the value of Egyptian fish Exports about 8.20%. The value of the Adjusted R Square

was about 0.97, this indicates that about 97% of the changes in the value of Egyptian Fish Exports are due to the change in the variables included in the relationship, the calculated F value (374.08)\*\* indicates the extent to which the used model matches the nature of the data under study.

**Recommendations:**

**Through the As previously research results, the research reached a number of recommendations that would work to adjust the Egyptian fish trade balance, which are as follows:**

- 1- Most of Egypt's Fish Exports are concentrated on fresh or chilled Fish, which confirms the need to encourage Fish industries to increase the added value of the Egyptian Product, which would have a positive impact on the Fish Balance as well as provide local job opportunities.
- 2- Expanding the geographical scope of Egypt's Exports by opening new Export Markets to avoid the risks that may occur such as the reluctance of countries to import from Egypt or any changes that occur, especially the Political, Climatic, Economic and Social changes, and thus the decrease in the foreign exchange return as well as the decrease in the per capita share of fish Exports as well as to increase the Export efficiency of fish and search for the highest Export prices in order to help bridge the deficit in the fish balance.
- 3- Expanding the geographical scope of Egyptian Fish Imports and continuing to Import low-priced Fish to bridge the Domestic deficit and limit the Import of expensive Fish in order to improve the Fish Balance.
- 4- Making the most of the high-priced Egyptian Fish Produced by well-known parties, such as Bardawil Lake Fish, in exporting all of its Production abroad to obtain good returns that help in the fish Balance.
- 5- Exploiting the state's interest in the field of Fish Production in the Production of high-quality varieties that help increase the amount of Exports abroad.
- 6- Exploiting the large water surface that Egypt owns in the Mediterranean and the Red Sea, whether by cultivating marine fish or fishing in the high seas using giant ships, which may increase the amount of fish production and thus increase Exports.
- 7- Work to increase Exports to most Arab countries such as Saudi Arabia, Kuwait, the Emirates and Jordan, and take advantage of the proximity of distances, which reduces costs and losses, and thus improves the fish balance.

**Table (8).** Most important variables affecting the value of Egyptian fish Exports during the period (2001-2021)

S	Independent variables	$\hat{Y}_i = a \pm b X$	R <sup>2</sup>	F	Regression	Elasticity
12	Domestic Production (th. Ton)	$\hat{Y}_i = -29265.09 + 37.19 X_i$ (-8.17) <sup>**</sup> (14.69) <sup>**</sup>	0.92	215.77 <sup>**</sup>	37.19	2.23
13	Export Price (dollar /ton)	$\text{Ln } \hat{Y}_i = 1.07 + 1.21 \text{Ln } X_i$ (0.21) (1.53)	0.06	2.35	N.S	N.S
14	Exchange Rate (LE/dollar)	$\hat{Y}_i = -3819.37 + 2863.29 X_i$ (-0.83) (6.11) <sup>**</sup>	0.65	37.28 <sup>**</sup>	2863.29	1.18
15	Lebanon's Imports of fresh and chilled Fish	$\text{Ln } \hat{Y}_i = -9.58 + 1.85 \text{Ln } X_i$ (-3.09) <sup>**</sup> (6.15) <sup>**</sup>	0.65	37.84 <sup>**</sup>	1.19	1.85
16	Saudi Imports of fresh and chilled Fish	$\text{Ln } \hat{Y}_i = -20.06 + 2.56 \text{Ln } X_i$ (-8.12) <sup>**</sup> (11.95) <sup>**</sup>	0.88	142.78 <sup>**</sup>	0.48	2.56
17	Kuwait's Imports of fresh and chilled Fish	$\hat{Y}_i = 5021.09 + 0.30 X_i$ (2.29) <sup>*</sup> (10.01) <sup>**</sup>	0.83	100.21 <sup>**</sup>	0.30	0.76
18	Italy's Imports of fresh and chilled Fish	$\text{Ln } \hat{Y}_i = -38.03 + 3.48 \text{Ln } X_i$ (-9.31) <sup>**</sup> (11.62) <sup>**</sup>	0.87	135.08 <sup>**</sup>	0.08	3.48
19	USA Imports of fresh and chilled Fish	$\hat{Y}_i = -25909.33 + 0.03 X_i$ (-7.14) <sup>**</sup> (13.62) <sup>**</sup>	0.90	185.41 <sup>**</sup>	0.03	2.13
20	Israel's imports of fresh and chilled fish	$\hat{Y}_i = 3542.51 + 0.324 X_i$ (1.49) (11.58) <sup>**</sup>	0.87	133.99 <sup>**</sup>	0.32	0.84
21	Jordan's Imports of fresh and chilled fish	$\text{Ln } \hat{Y}_i = -3.87 + 1.48 \text{Ln } X_i$ (-3.87) <sup>**</sup> (13.37) <sup>**</sup>	0.90	178.67 <sup>**</sup>	3.02	1.48
22	UAE Imports of fresh and chilled fish from 2012	$\text{Ln } \hat{Y}_i = 3.79 + 0.56 \text{Ln } X_i$ (1.95) (3.43) <sup>**</sup>	0.54	11.74 <sup>**</sup>	0.14	0.56
23	A. p. c. n. i. in Lebanon	$\text{Ln } \hat{Y}_i = 2.92 + 3.57 \text{Ln } X_i$ (3.04) <sup>**</sup> (6.87) <sup>**</sup>	0.70	47.15 <sup>**</sup>	11516.13	3.57
24	A. p. c. n. i. in Saudi Arabia	$\text{Ln } \hat{Y}_i = 0.87 + 3.05 \text{Ln } X_i$ (1.11) (11.10) <sup>**</sup>	0.86	123.00 <sup>**</sup>	3630.95	3.05
25	A. p. c. n. i. in Kuwait	$\text{Ln } \hat{Y}_i = 2.83 + 1.84 \text{Ln } X_i$ (0.96) (2.25) <sup>*</sup>	0.17	5.05 <sup>*</sup>	227.16	1.84
26	A. p. c. n. i. in the UAE	$\text{Ln } \hat{Y}_i = -12.20 + 5.88 \text{Ln } X_i$ (-2.51) <sup>*</sup> (4.45) <sup>**</sup>	0.46	19.81 <sup>**</sup>	3062.50	5.88
27	A. p. c. n. i. in Italy	$\text{Ln } \hat{Y}_i = -5.09 + 4.18 \text{Ln } X_i$ (-1.29) (3.69) <sup>**</sup>	0.39	13.60 <sup>**</sup>	2662.42	4.18
28	A. p. c. n. i. in USA	$\hat{Y}_i = -67012.48 + 1683.43 X_i$ (-8.33) <sup>**</sup> (10.83) <sup>**</sup>	0.85	177.22 <sup>**</sup>	1683.43	4.19
29	A. p. c. n. i. in Israel	$\text{Ln } \hat{Y}_i = -3.58 + 3.82 \text{Ln } X_i$ (-4.58) <sup>**</sup> (16.71) <sup>**</sup>	0.93	279.09 <sup>**</sup>	2546.67	3.82
30	A. p. c. n. i. in Jordan	$\text{Ln } \hat{Y}_i = 5.24 + 3.63 \text{Ln } X_i$ (18.02) <sup>**</sup> (14.99) <sup>**</sup>	0.92	224.65 <sup>**</sup>	22687.50	3.63
31	population Lebanon	$\text{Ln } \hat{Y}_i = -4.46 + 8.40 \text{Ln } X_i$ (-2.78) <sup>*</sup> (8.69) <sup>**</sup>	0.79	75.46 <sup>**</sup>	33600	8.40
32	population Saudi Arabia	$\text{Ln } \hat{Y}_i = -14.14 + 6.99 \text{Ln } X_i$ (-12.68) <sup>**</sup> (21.19) <sup>**</sup>	0.96	449.11 <sup>**</sup>	4957.45	6.99
33	population Kuwait	$\text{Ln } \hat{Y}_i = 4.97 + 3.98 \text{Ln } X_i$ (18.79) <sup>**</sup> (17.45) <sup>**</sup>	0.94	304.39 <sup>**</sup>	26533.33	3.98
34	population UAE	$\text{Ln } \hat{Y}_i = 3.57 + 3.06 \text{Ln } X_i$ (9.17) <sup>**</sup> (15.38) <sup>**</sup>	0.92	236.57 <sup>**</sup>	8742.86	3.06
35	population Italy	$\text{Ln } \hat{Y}_i = -200.53 + 51.48 \text{Ln } X_i$ (-8.94) <sup>**</sup> (9.36) <sup>**</sup>	0.81	87.64 <sup>**</sup>	18255.31	51.48
36	population USA	$\text{Ln } \hat{Y}_i = -126.08 + 23.62 \text{Ln } X_i$ (-16.99) <sup>**</sup> (18.26) <sup>**</sup>	0.94	333.54 <sup>**</sup>	1593.79	23.62
37	population Israel	$\text{Ln } \hat{Y}_i = -10.25 + 9.61 \text{Ln } X_i$ (-7.43) <sup>**</sup> (14.30) <sup>**</sup>	0.91	204.38 <sup>**</sup>	25972.97	9.61
38	population Jordan	$\text{Ln } \hat{Y}_i = 1.15 + 4.11 \text{Ln } X_i$ (1.56) (11.32) <sup>**</sup>	0.86	128.10 <sup>**</sup>	11108.11	4.11
39	X <sub>1</sub> Saudi population X <sub>2</sub> Saudi imports of fresh and chilled fish	$\text{Ln } \hat{Y}_i = -17.07 + 5.05 \text{Ln } X_{1i} + 0.82 \text{Ln } X_{2i}$ (-14.36) <sup>**</sup> (8.48) <sup>**</sup> (3.62) <sup>**</sup>	0.97	374.08 <sup>**</sup>	Stepwise Regression	

Imports of fresh and chilled fish, Average per capita national income (thousand dollar), population (million)  
 Values in parentheses are negative. Elasticity= Regression value x (Mean Independent Variable/Mean Dependent Variable)

Source: Collected and calculated from Table (2) in the Appendix.



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## Appendices:

Table 1. most important variables affecting Egyptian Fish Imports during the period (2001-2021)

Numbers in brackets are positive

Year	Egyptian Imports million dollar	Import Price thousand (dollar/ton)	Population (million)	Fish Gap thousand ton	% self-sufficiency	Average per capita consumption per year (kg)	Gap Red Meat thousand ton	Gap Poultry Meat thousand ton	Retail Price Red Meat (LE/kg)	Retail Price Poultry Meat (LE/kg)	Per Capita National Income in thousand dollar
2001	92.161	0.514	65.30	260.52	74.75	15.79	851.00	0.64	17.12	5.31	1.38
2002	65.026	0.610	66.63	151.90	84.07	14.30	133.00	(2.25)	18.03	5.76	1.28
2003	61.166	0.570	67.97	159.85	84.57	15.24	126.00	(0.99)	20.84	6.44	1.19
2004	97.728	0.552	69.33	218.90	79.80	15.63	108.00	0.30	24.51	8.07	1.15
2005	90.449	0.489	70.67	183.10	82.93	15.32	198.00	(0.66)	26.86	7.30	1.16
2006	104.318	0.501	72.01	203.52	82.67	16.62	298.00	10.38	29.37	8.37	1.26
2007	165.999	0.752	73.61	254.49	79.84	16.40	326.00	9.27	32.86	8.62	1.46
2008	269.676	2.578	75.23	130.07	89.14	15.95	330.00	(41.9)	36.26	11.94	1.75
2009	377.961	2.843	76.82	113.01	90.63	15.89	127.00	24.00	40.48	12.01	2.01
2010	385.909	2.108	78.73	246.20	84.13	19.70	191.00	28.00	53.73	14.62	2.25
2011	403.172	2.261	80.41	172.83	88.74	19.09	214.00	30.00	58.60	16.63	2.43
2012	531.686	1.933	82.55	319.02	81.13	20.55	165.00	37.00	62.90	20.36	2.69
2013	434.566	1.837	84.63	215.6	87.09	19.73	333.00	74.00	67.15	22.63	2.87
2014	562.317	2.331	86.81	326.12	81.96	20.83	367.00	71.00	77.94	24.92	3.06
2015	559.902	1.381	88.96	271.06	84.86	20.18	720.00	98.00	86.69	24.50	3.16
2016	479.085	2.134	91.02	263.70	86.61	21.64	432.00	85.00	97.67	27.92	3.26
2017	567.338	1.291	95.20	330.53	84.66	22.72	625.00	119.00	139.33	32.92	2.87
2018	727.406	1.930	97.15	298.26	86.64	22.98	902.00	58.00	148.32	30.58	2.65
2019	849.174	1.627	98.90	471.01	81.23	25.38	445.00	73.00	144.31	29.30	2.55
2020	692.618	1.144	100.62	571.42	77.87	25.66	440.00	44.00	132.94	27.80	2.86
2021	553.213	1.711	102.061	226.04	89.85	25.52	424.00	68.00	137.51	30.94	3.35
Average	384.327	1.481	82.124	256.531	83.961	19.291	369.286	41.686	69.211	17.949	2.221

## Source:

Central Agency for Public Mobilization and Statistics, Annual Bulletin of the Movement of Production, Foreign Trade, and Available for Consumption of Agricultural Commodities, separate issues.

- Central Agency for Public Mobilization and Statistics, Annual Bulletin of Prices for Foodstuffs, Products, and Services (Producer/Wholesale/Consumer), separate issues.
- Lakes and Fish Resources Protection and Development Authority (formerly the General Authority for Fish Resources Development), Fish Statistical Year book, separate issues.
- International Trade Center database, <https://www.trademap.org>, World Bank Open Database, <https://data.albankaldawli.org/>

Table 2. most important variables affecting Egyptian Fish Exports during the period (2001-2021)

Imports of fresh and chilled fish (thousand dollar)

Year	value of Egyptian Exports thousand dollar	Domestic production Fish thousand ton	Export Price (dollar/ton)	Exchange Rate (LE/dollar)	Lebanon's Imports of fresh and chilled fish	Saudi Imports of fresh and chilled fish	Kuwait Imports of fresh and chilled fish	UAE Imports of fresh and chilled fish	Italy Imports of fresh and chilled fish	US Imports of fresh and chilled fish	Israel Imports of fresh and chilled fish	Jordan Imports of fresh and chilled fish
2001	1253	771	1055	3.97	16989	42830	8786		424394	774728	1618	2929
2002	2221	801	876	4.5	15542	48658	0		438831	954274	2491	1704
2003	2853	876	995	5.85	14496	56502	0		565295	964137	2815	2165
2004	3262	865	489	6.2	14707	74395	0		648468	934553	0	3497
2005	3970	889	900	5.78	16011	73094	0	22002	696837	1016239	5275	4066
2006	3363	971	838	5.73	15071	75240	19207		745042	1162400	2756	4714
2007	4450	1008	868	5.64	18092	63998	15672	28915	839051	1225304	3865	6097
2008	10818	1068	924	5.43	23368	86382	26512	39371	839354	1178581	8977	6622
2009	13488	1093	1020	5.54	29588	106081	22681		838119	1182514	17783	7243
2010	15004	1305	1443	5.62	37411	123451	24101		923169	1327673	47128	7235
2011	23355	1362	2162	5.93	39797	144057	30147		1039046	1330216	61248	9656
2012	18239	1372	1164	6.06	39695	148243	37486	36864	862529	1360778	59128	10070
2013	23587	1454	1042	6.87	46389	171381	31608	117354	934211	1506373	76050	11089
2014	31046	1482	1049	7.08	49561	176231	68972	143269	987438	1584334	92259	14075
2015	29493	1519	814	7.69	44064	137610	91431	146382	933860	1686376	104490	17609
2016	43244	1706	1247	10.03	53737	143636	105353	165259	1103555	1962525	124899	18908
2017	36563	1823	1039	17.78	57633	134199	100755	167723	1140575	2104856	128071	19247
2018	33075	1935	1239	17.77	58473	137380	113333	149435	1221462	2271521	112760	17142
2019	52604	2039	1505	16.77	47634	131198	119474	156319	1240684	2305966	99920	15510
2020	35813	2011	1237	15.76	22758	126412	161105	144458	1066789	1882864	93174	16177
2021	52180	2002	537	15.64	20596	163050	142081	160286	1378444	2545915	114503	17719
Average	20946.714	1350.123	1068.714	8.65	32457.714	112572.762	53271.619	138734.9	898435.857	1488672.714	55200.476	10165.429

Source: International Trade Center database, <https://www.trademap.org>

**Table 2. follows the most important variables affecting Egyptian fish Exports during the period (2001-2021).**

Population (million) average per capita national income (Thousand dollar)

Year	Average per capita national Income Lebanon	Average per capita national Income Saudi Arabia	Average per capita national Income Kuwait	Average per capita national Income UAE	Average per capita national Income Italy	Average per capita national Income USA	Average per capita national Income Israel	Average per capita national Income Jordan	Lebanon pop.	Saudi Arabia pop.	Kuwait pop.	UAE pop.	Italy pop.	USA pop.	Israel pop.	Jordan pop.
2001	4.060	8.180	19.710	30.570	21.190	36.700	19.920	1.760	4.389	22.086	1.992	3.454	56.974	284.969	6.439	5.163
2002	3.950	8.070	19.760	29.620	20.770	37.310	19.130	1.790	4.447	22.623	2.047	3.634	57.059	287.625	6.570	5.276
2003	3.690	9.200	23.240	31.910	23.410	39.750	19.300	1.920	4.505	23.151	2.102	3.813	57.313	290.108	6.690	5.396
2004	4.720	10.800	29.130	36.840	28.360	43.510	20.680	2.180	4.575	23.662	2.153	3.993	57.685	292.805	6.809	5.532
2005	4.940	12.350	35.760	40.190	32.480	46.180	22.190	2.370	4.643	24.398	2.235	4.281	57.969	295.517	6.930	5.679
2006	4.900	13.670	42.480	42.600	34.280	47.830	23.030	2.480	4.720	25.383	2.363	4.899	58.144	298.38	7.054	6.076
2007	5.360	15.080	47.530	41.580	35.930	48.500	24.710	2.640	4.810	26.400	2.507	5.873	58.438	301.231	7.18	6.473
2008	5.910	17.420	51.810	40.490	37.980	49.100	26.900	3.070	4.888	27.437	2.651	6.989	58.827	304.094	7.309	6.633
2009	6.680	16.730	45.410	34.670	37.990	47.870	27.940	3.440	4.951	28.484	2.796	7.993	59.095	306.772	7.486	6.78
2010	7.410	17.480	43.190	33.670	37.960	49.150	30.280	3.690	4.996	29.412	2.943	8.482	59.277	309.327	7.624	6.931
2011	7.800	19.580	44.120	36.540	37.980	50.620	32.320	3.910	5.045	30.151	3.144	8.575	59.379	311.583	7.766	7.110
2012	8.080	22.740	49.020	41.810	36.220	52.790	33.020	4.180	5.178	30.822	3.395	8.665	59.540	313.878	7.911	7.212
2013	7.970	24.280	51.310	45.850	35.570	53.990	35.080	4.240	5.679	31.482	3.647	8.752	60.234	316.06	8.060	7.695
2014	7.520	24.590	50.050	47.420	34.910	55.80	36.670	4.040	6.274	32.126	3.762	8.836	60.789	318.386	8.216	8.658
2015	7.440	22.970	41.040	46.270	33.000	56.620	36.640	3.860	6.399	32.750	3.909	8.917	60.731	320.739	8.380	9.494
2016	7.750	20.980	34.540	44.460	31.970	57.140	36.970	3.830	6.259	33.416	4.048	8.994	60.627	323.072	8.546	9.965
2017	8.320	19.350	30.880	42.090	31.380	59.220	38.320	3.920	6.109	34.193	4.125	9.068	60.537	325.122	8.713	10.215
2018	8.760	21.040	32.300	44.350	33.850	63.460	41.690	4.090	5.951	35.018	4.317	9.140	60.422	326.838	8.883	10.460
2019	8.630	22.210	34.290	46.210	34.930	66.130	44.070	4.200	5.782	35.827	4.441	9.212	59.729	328.330	9.054	10.699
2020	6.400	21.540	33.295	41.770	32.410	64.650	43.310	4.070	5.663	35.997	4.360	9.287	59.439	331.501	9.215	10.929
2021	5.110	21.875	33.793	43.990	35.990	70.930	49.290	4.170	5.593	35.950	4.250	9.365	59.110	331.894	9.364	11.148
Average	6.448	17.625	37.746	40.138	32.789	52.250	31.498	3.326	5.279	29.560	3.199	7.249	59.110	310.392	7.819	7.787

Source: International Trade Center database, <https://www.trademap.org>

World Bank Open Database, <https://data.albankaldawli.org/>