

Egypt Imports Analysis

Across all Sectors from 2005 : 2023
(23/10/2024)



Team Members

Amani Mustafa Mahmoud	Data cleaning and preprocessing
Mohamed Eid	Creating physical database
Mahmoud Fawzy	EDA (Exploratory Data Analysis) Using SQL querying
Mohamed Yehia	Data Visualization
Mahmoud Al-Sayed	Recommendations and solutions study
Maher Mahmoud Maher	project facilitator, predictive analysis, presentation

Tools Used

Asana	Project Management Tool
Excel (power query)	Data cleaning and preprocessing
Mermaid.js	ER diagram
SQL Server	As a Database Engine
Python	Using Keras for Predictive Analysis
PowerBI	Developing Star schema Dashboards and Visualization
PowerPoint	Story Telling Presenting

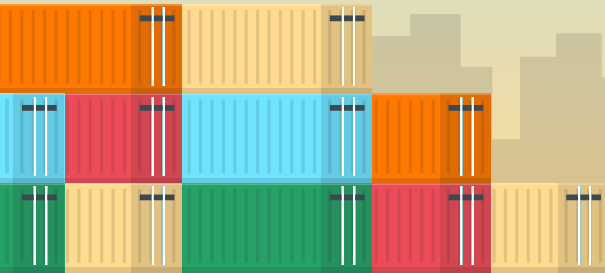
Objectives

Using the data that Central Bank of Egypt Provided for Egypt Trades from 2005 to 2022:

- Assess economic performance
- Forecast future trends
- Support informed decision-making
- Track subsequent changes

Targets:

Policymakers - Business stakeholders



Data Source

Central Bank of Egypt
(Economic Studies > Time-series > International-Trades)

English **حماية حقوق العملاء** علاقات المستثمرين اتصل بنا التوظيف

البنك المركزي المصري
CENTRAL BANK OF EGYPT

البنك المركزي المصري
CENTRAL BANK OF EGYPT

التوظيف الرئيسية عن البنك المركزي الأخبار والمنشورات الاستدامة الشفافية المالي

تحقيق سلامة النظام النقدي والمصرفي واستقرار الأسعار في إطار السياسة الاقتصادية العامة للدولة

عما تبحث؟

البنك المركزي المصري بطرح عملة جديدة من فئة الـ 20 جنيها من البوليمر

16 أكتوبر 2024 البنك المركزي المصري يؤكد على أهمية الحفاظ على سرية البيانات البنكية والشخصية

لجنة السياسة النقدية تقرر الإبقاء على أسعار العائد الأساسية دون تغيير

Analysis Stages

01

Data cleaning

02

Physical DB

03

EDA

04

**Predictive
Analysis**

05

Visualizations

06

Recommendations



Kanban Board

Using Asana as Project Management Tool

The screenshot displays an Asana Kanban Board for a project titled "Egypt Imports Analysis". The board is organized into four columns: "Tasks", "In progress", "Review", and "Complete". Each column contains task cards with titles, status icons, and assignee avatars. The "Tasks" column has two cards: "Presentation file" and "Finalizing Phase". The "In progress" column has two cards: "Predictive Analysis" and "Report Phase + Recommendations". The "Review" column has two cards: "EDA Phase using sql queries" and "Visualization + Dashboard". The "Complete" column has three cards: "Excel Cleaning + CSV", "Design Schema", and "Creating Physical Database". The interface includes a top navigation bar with various views (Overview, List, Board, Timeline, Dashboard, Calendar, Workflow, Messages, Files) and a bottom section with a "+ Add task" button for each column.

Egypt Imports Analysis On track Share Customize

Overview List **Board** Timeline Dashboard Calendar Workflow Messages Files +

+ Add task Filter Sort Group Options

Tasks 2 + ... **In progress** 2 + ... **Review** 2 + ... **Complete** 3 + ...

Tasks

- ✓ Presentation file
- ✓ Finalizing Phase

In progress

- ✓ Predictive Analysis
- ✓ Report Phase + Recommendations

Review

- ✓ EDA Phase using sql queries
- ✓ Visualization + Dashboard

Complete

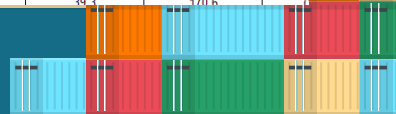
- ✓ Excel Cleaning + CSV
- ✓ Design Schema
- ✓ Creating Physical Database

+ Add task + Add task + Add task



01

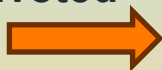
Data cleaning and preprocessing



Data preprocessing

1. **Merging** the 2 files into one
2. **REMOVING** the addition columns and blank row
3. **Checking** for Errors or missing values
4. **Standarize** the year format
5. Using **PowerQuery** for **Un-pivotting** and transforming it into **Tapular form**
6. Export the Outcome into **CSV file**

Data Unpivoted



	A	B	C	D	E	F
1	product	sector	year	import	export	Surplus / Deficit
2	Crude oil	Oil merchandise	2005	2844.2	3213.8	369.6
3	Crude oil	Oil merchandise	2006	1560.2	3128.3	1568.1
4	Crude oil	Oil merchandise	2007	5086	4910.5	-175.5
5	Crude oil	Oil merchandise	2008	2613	4004.3	1391.3
6	Crude oil	Oil merchandise	2009	1876.7	4475	2598.3
7	Crude oil	Oil merchandise	2010	2334	5662	3328
8	Crude oil	Oil merchandise	2011	2050.9	5211	3160.1
9	Crude oil	Oil merchandise	2012	2665	7303.2	4638.2
10	Crude oil	Oil merchandise	2013	2093	7715	5622
11	Crude oil	Oil merchandise	2014	2492.4	6158.2	3665.8
12	Crude oil	Oil merchandise	2015	910.7	3557.9	2647.2
13	Crude oil	Oil merchandise	2016	1898.9	3876	1977.1
14	Crude oil	Oil merchandise	2017	2534.4	4600.8	2066.4
15	Crude oil	Oil merchandise	2018	2567.8	4851.3	2283.5
16	Crude oil	Oil merchandise	2019	4286.3	3245	-1041.3
17	Crude oil	Oil merchandise	2020	3439	2677.8	-761.2
18	Crude oil	Oil merchandise	2021	4525	3845.3	679.7



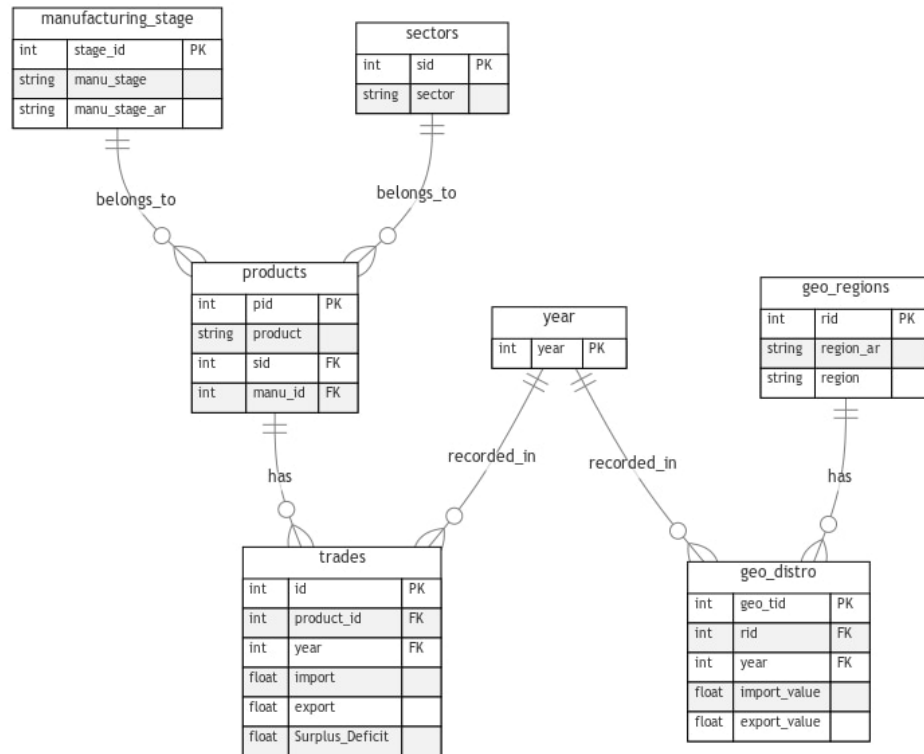
02

Creating physical database

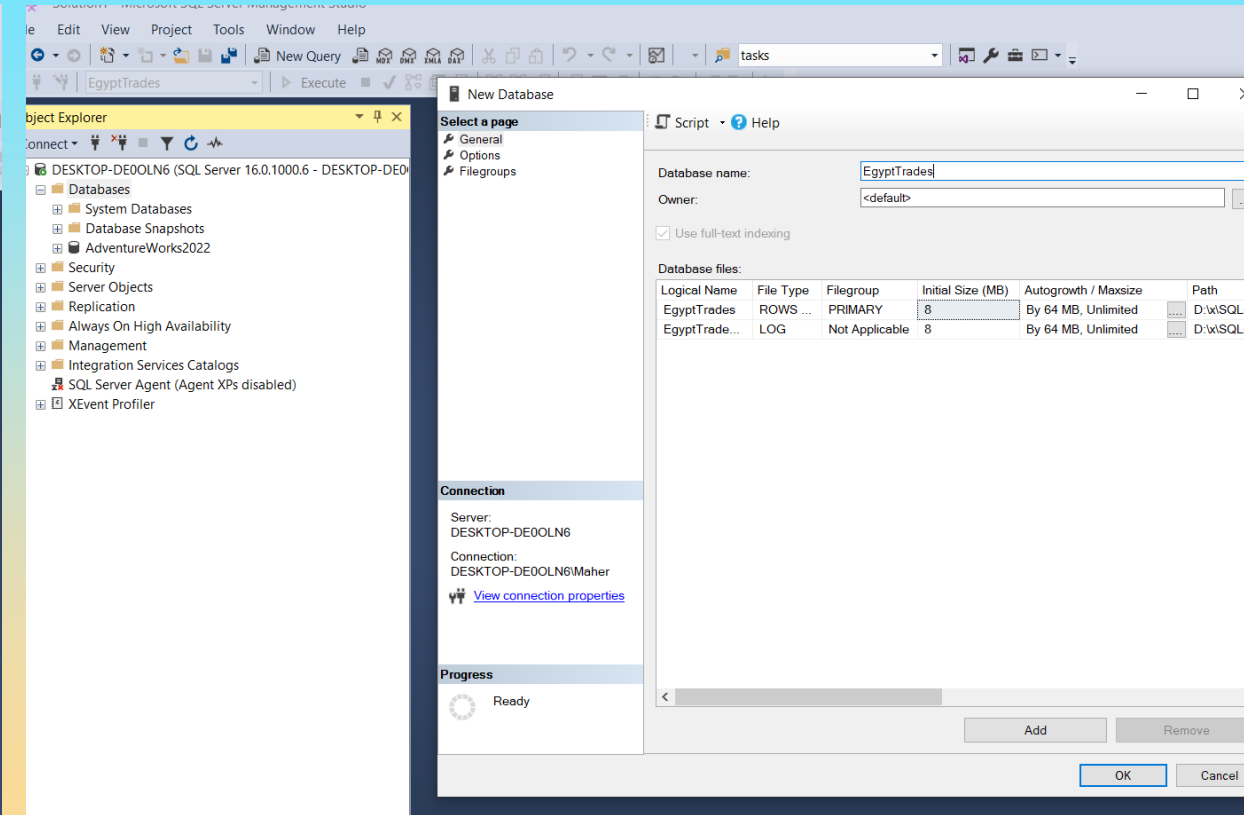
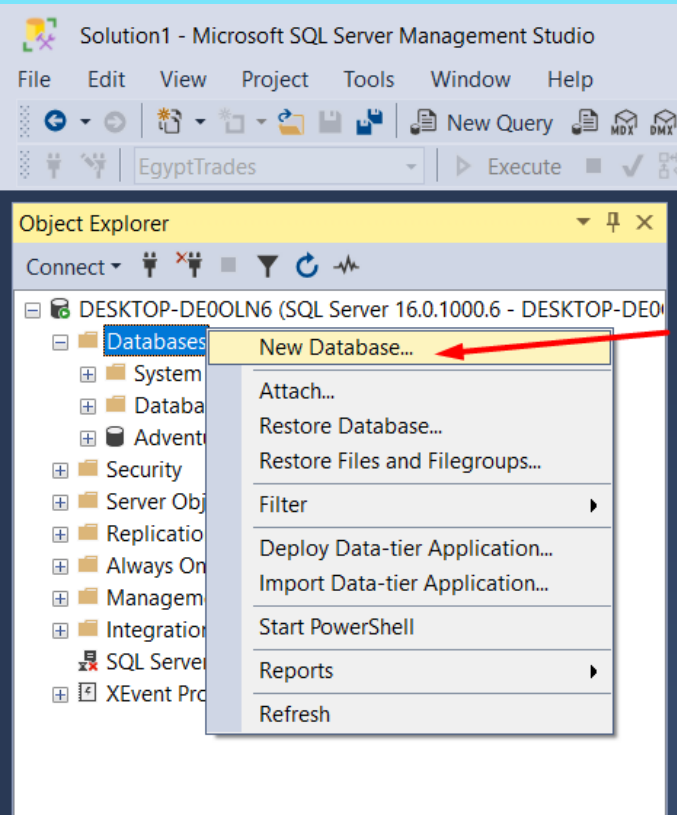
ER Diagram & Normalizing Data

1. Adding new 2 perceptives to the analysis ((Geographical Distribution – Manufacturing Stage))
2. Plan for the **ER Diagram** and present planned schema using Mermaid.js
3. **Normalizing** the data tables into planned one
4. Export it into csv files to import it into sql server

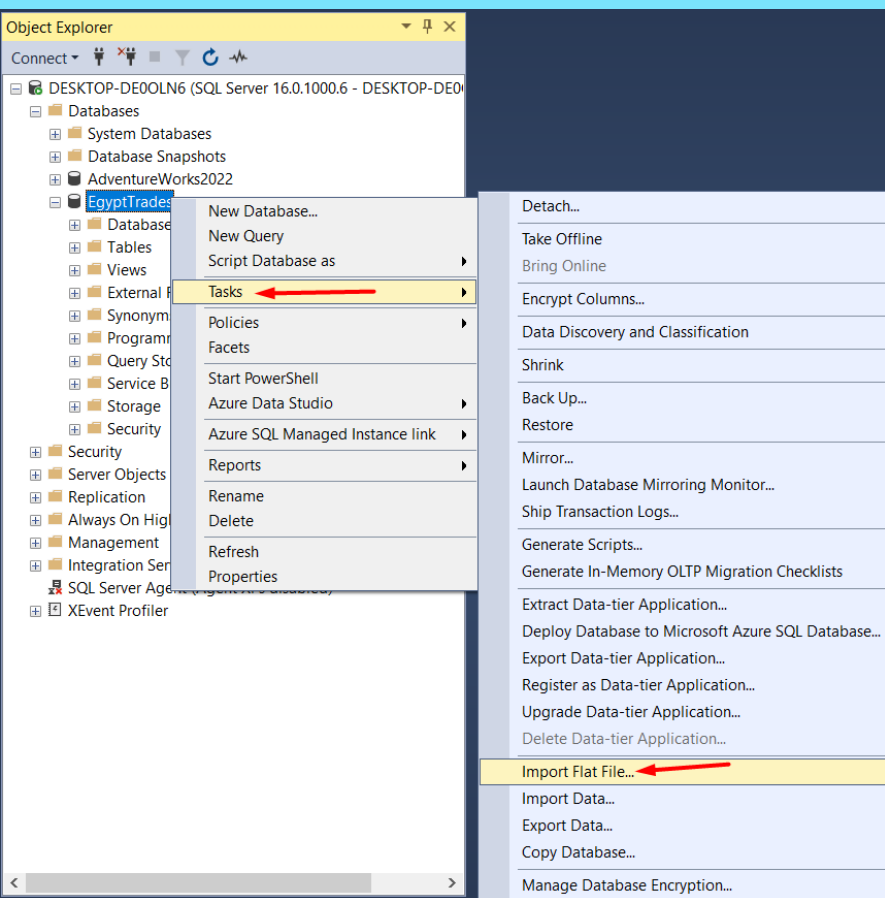
Planned Schema



Creating physical Database



Importing the CSV files



Import Flat File 'EgyptTrades'



Modify Columns

Introduction

Specify Input File

Preview Data

Modify Columns

Summary

Results

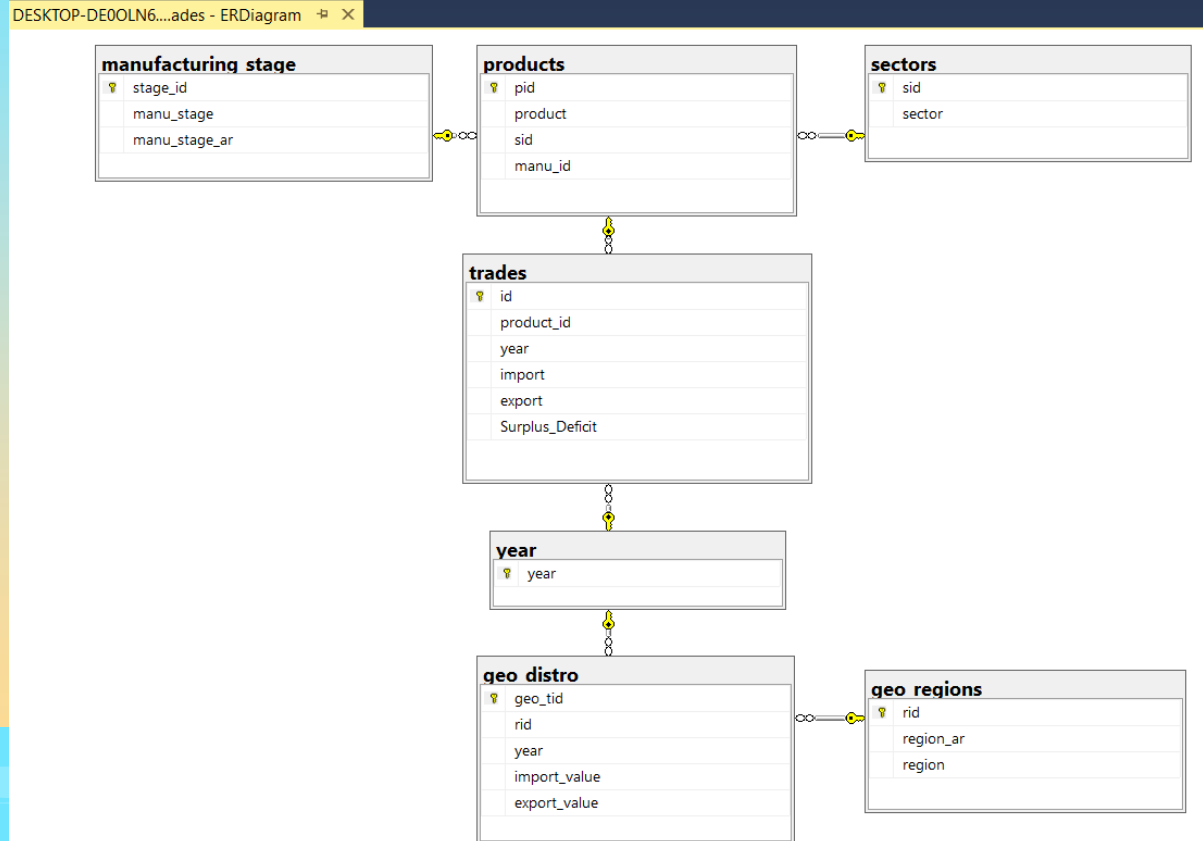
Define Primary Keys

Modify Columns

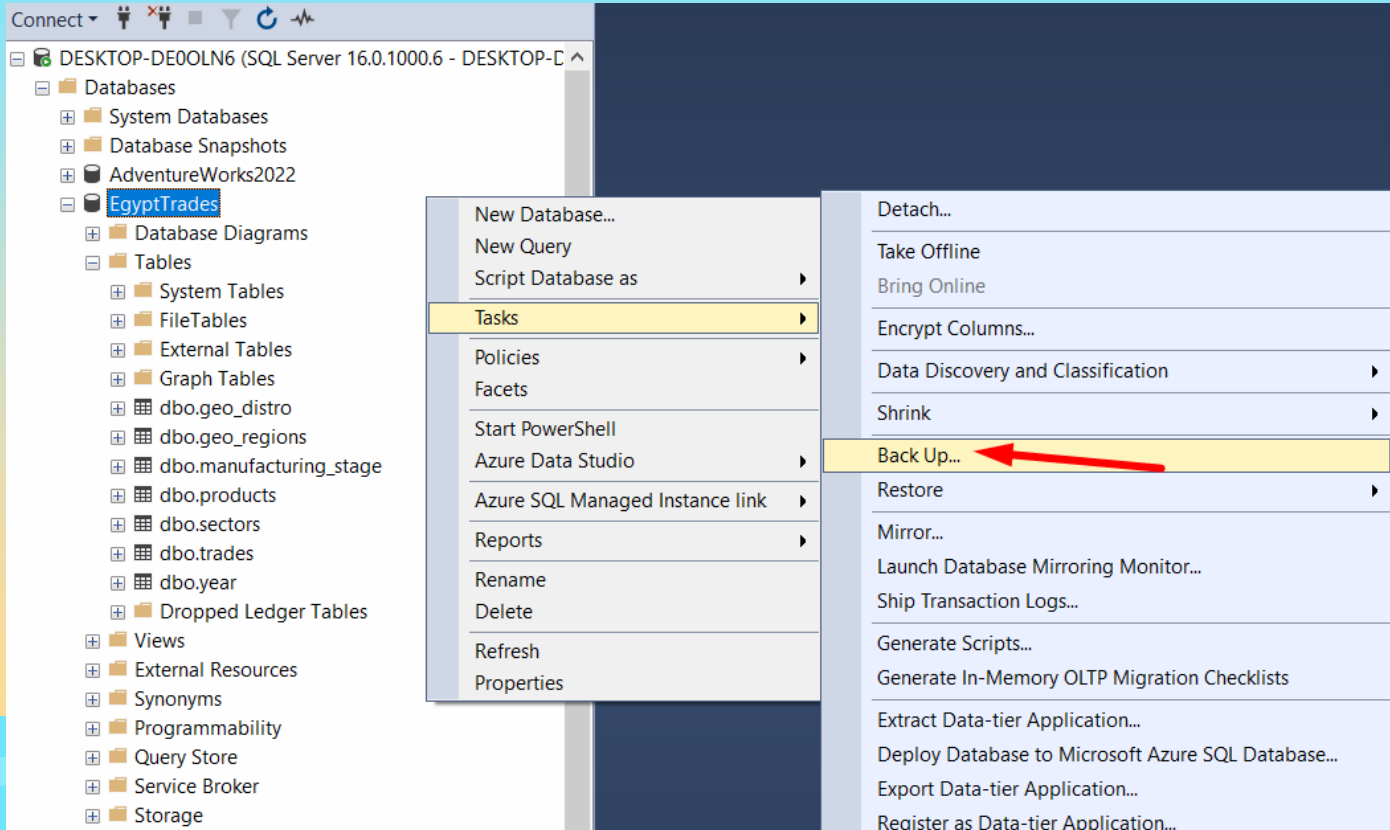
This operation generated the following table schema. Please verify if schema is correct. If not, please make any changes.

Column Name	Data Type	Primary Key	Allow Nulls
geo_tid	tinyint	<input checked="" type="checkbox"/>	<input type="checkbox"/>
rid	tinyint	<input type="checkbox"/>	<input type="checkbox"/>
year	smallint	<input type="checkbox"/>	<input type="checkbox"/>
import_value	float	<input type="checkbox"/>	<input type="checkbox"/>
export_value	float	<input type="checkbox"/>	<input type="checkbox"/>

Creating Relations between tables and Final Logical Schema

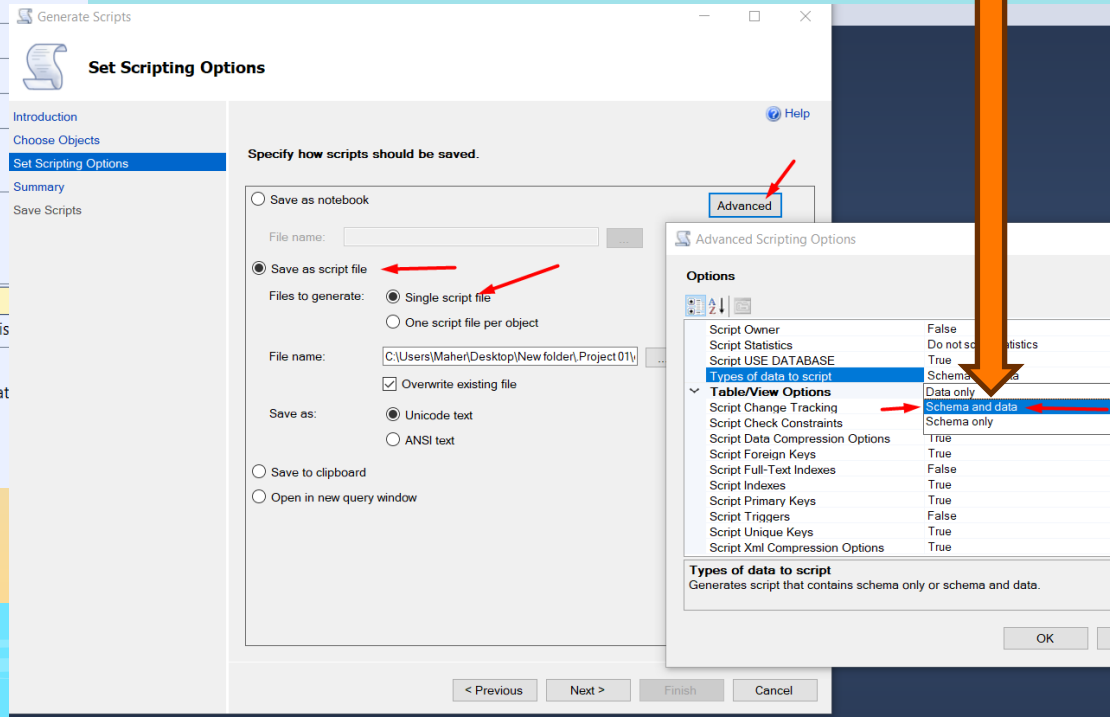
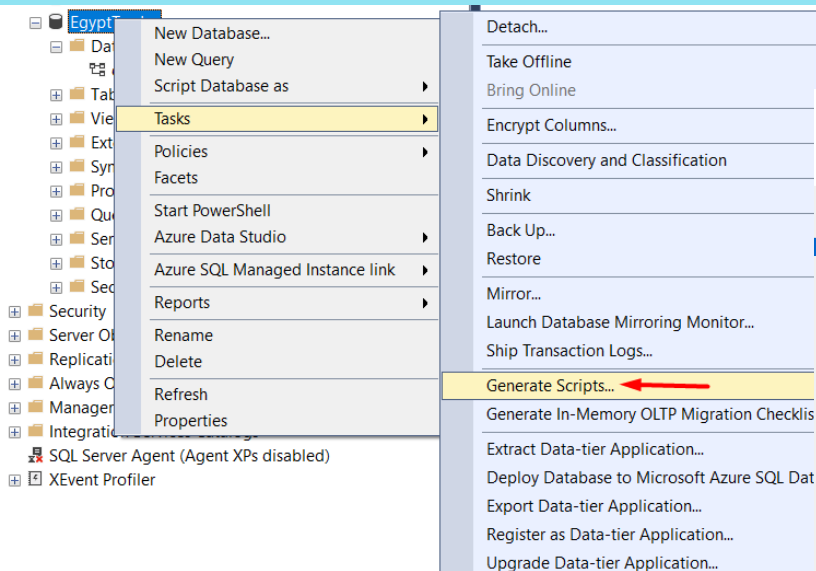


Export the Database into .bak file



Export DB into SQL Script for Members with outdated ver.

Fully export of Database (Schema and Data)





03

EDA

Exploratory Data Analysis

EDA

Key Metrics & Questions



KPIs

- 1- Total Annual Import Values
(product - economic sector - manufacturing stage - region)
- 2- Percentage Distributions
(total imports - Regional - Manufacturing stage - Sector)
- 3- Growth & Change Metrics
(Year-over-year change rates - Crisis period impact -
Sector growth rates)



Questions

- 1- Top Import Products (2005-2023) ?
- 2- Major Import Source Regions
- 3- Manufacturing Stage Distribution
- 4- Leading Import Sectors
- 5- Crisis Impact
- 6- Declining Import Sectors
- 7- Commodity Import Ratios
- 8- High-Growth Import Sectors



SQL queries

Applying multiple SQL queries to
extract key findings

--8. What are the differences in imports by year?

--KPIs:
--Yearly growth rate of imports: To see the annual increase or decrease in imports.
--Years of significant changes: Identify years that have seen significant changes in imports.

```
WITH yearly_imports AS (  
  SELECT year, SUM(import) AS total_import_value  
  FROM Trades  
  GROUP BY year)  
SELECT year, total_import_value,  
  LAG (total_import_value) OVER (ORDER BY year) AS previous_year_import_value,  
  (total_import_value - LAG(total_import_value) OVER (ORDER BY year)) AS difference_in_imports,  
  ((total_import_value - LAG(total_import_value) OVER (ORDER BY year))  
   / LAG(total_import_value) OVER (ORDER BY year) * 100) AS percentage_change  
FROM yearly_imports  
ORDER BY year;
```

	123year	123total_import_value	123previous_year_import_value	123difference_in_imports	123percentage_change
1	2,005	30,441	[NULL]	[NULL]	[NULL]
2	2,006	38,308.1	30,441	7,867.1	25.844
3	2,007	52,771.201	38,308.1	14,463.1	37.755
4	2,008	50,342.199	52,771.201	-2,429.001	-4.603
5	2,009	48,993.1	50,342.199	-1,349.099	-2.68
6	2,010	54,095.5	48,993.1	5,102.399	10.415
7	2,011	59,210.899	54,095.5	5,115.399	9.456
8	2,012	57,682.8	59,210.899	-1,528.099	-2.581
9	2,013	60,181.9	57,682.8	2,499.101	4.332
10	2,014	61,305.501	60,181.9	1,123.601	1.867
11	2,015	57,387.701	61,305.501	-3,917.801	-6.391
12	2,016	59,003.001	57,387.701	1,615.3	2.815
13	2,017	63,102.999	59,003.001	4,099.998	6.949
14	2,018	66,529.4	63,102.999	3,426.4	5.43
15	2,019	62,841.1	66,529.4	-3,688.3	-5.544
16	2,020	70,736.101	62,841.1	7,895.002	12.563
17	2,021	87,302.4	70,736.101	16,566.299	23.42
18	2,022	70,783.6	87,302.4	-16,518.8	-18.921

SQL queries

Applying multiple SQL queries to extract key findings

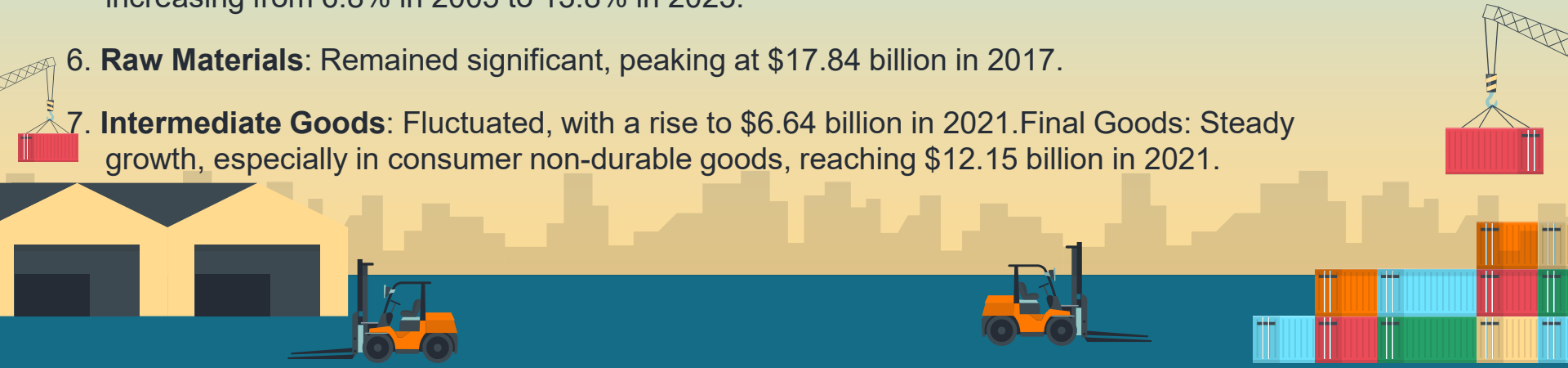
--2. What are the top geographic regions from which Egypt imports between 2005 and 2023?
--KPIs:
--Total value of imports per geographic region annually: To know the regions on which Egypt depends for imports.
--Percentage of each region of total imports: To determine the share of each geographic region.

```
SELECT gr.region, gd.year, SUM(gd.import_value) AS Total_Import_Value,  
       (SUM(gd.import_value) / (SELECT SUM(import_value) FROM geo_distro WHERE year = gd.year) * 100) AS Percentage_of_total_imports  
FROM   geo_distro gd  
JOIN   geo_regions gr ON gd.rid = gr.rid  
GROUP BY gr.region, gd.year  
ORDER BY gd.year, total_import_value DESC;
```

	ABC region	123 year	123 Total_Import_Value	123 Percentage_of_total_imports
152	African countries (excluding Arab countries)	2,021	587.2	0.673
153	Australia	2,021	536.9	0.615
154	Asian countries (excluding Arab countries)	2,022	17,165.6	24.251
155	EU	2,022	14,880.9	21.023
156	Arab countries	2,022	14,476	20.451
157	Other countries and regions	2,022	9,503.1	13.426
158	Other European countries	2,022	6,685.6	9.445
159	USA	2,022	4,205.8	5.942
160	Russian Federation & C.I.S.	2,022	3,036.6	4.29
161	African countries (excluding Arab countries)	2,022	468.9	0.662
162	Australia	2,022	361.1	0.51

Key Findings

1. **Overall Imports:** Egypt's total imports rose from \$28.66 billion in 2005 to \$77.52 billion in 2023, indicating a substantial increase of 170%.
2. **Top Trading Partners:** The USA, China, and Germany were Egypt's main suppliers in 2023, accounting for 42% of total imports.
3. **Major Import Categories:** Machinery (28%), mineral fuels (15%), and food (12%) dominated import categories.
4. **Growth Trends:** Significant growth in imports from China and the USA, with China's share increasing from 6.8% in 2005 to 13.8% in 2023.
6. **Raw Materials:** Remained significant, peaking at \$17.84 billion in 2017.
7. **Intermediate Goods:** Fluctuated, with a rise to \$6.64 billion in 2021. **Final Goods:** Steady growth, especially in consumer non-durable goods, reaching \$12.15 billion in 2021.



Key Findings

8. **Raw materials** averaged 20-24%, **intermediate goods** around 6-10%, and final goods grew over time.

9. **Key Year:** 2021 marked a peak in consumer non-durable goods due to changing demand.

10. Key Findings on Imports by Economic Sector (2005-2023)

Top Sector: Oil merchandise consistently had the highest import value, peaking at approximately \$12.49 billion in 2017.

Other Significant Sectors: **Base metals** & products and **chemicals merchandise** were major contributors. Vehicles, cars, and transportation also recorded substantial imports.

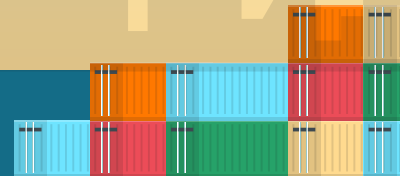
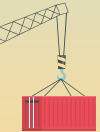
11. **Impact of Global Economic Crises** on Egypt's Imports

2008 Financial Crisis: Total Imports (2008): \$50.34 billion.

Decline in 2009: Imports fell to \$48.99 billion, a decrease of 2.68%.

COVID-19 Pandemic: Total Imports (2020): \$70.74 billion.

Significant Growth in 2021: Imports surged to \$87.30 billion, reflecting a 23.42% increase from 2020.



Key Findings

12. Total imports Yearly **Growth Rates**:

2021: Peak increase of 23.42%.

2022: Notable decline of 18.92% after a peak in 2021.

13. **Most Significant Declines in Imports (2022):**

Vehicles & Transportation: Decline: \$2.68 billion

Base Metals & Products: Decline: \$1.89 billion

Chemicals Merchandise: Decline: \$1.81 billion

14. **Least Significant Declines in Imports (2022):**

Oil Merchandise: Decline: \$138.10 million

Machinery & Equipment: Decline: \$1.27 billion

Cotton & Textiles: Decline: \$1.29 billion



04

Predictive Analysis



Data preprocessing

- 1- Targeting **Sectors Imports** only for analysis
2. **Remove** unwanted columns using power query
- 3- Transform the data to have a **chronological time order** by pivoting.

	A	B	C	D	E	F
1	product	sector	year	import	export	Surplus / Deficit
2	Crude oil	Oil merchandise	2005	2844.2	3213.8	369.6
3	Crude oil	Oil merchandise	2006	1560.2	3128.3	1568.1
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17	Crude oil	Oil merchandise	2020	3439	2677.8	-761.2
18	Crude oil	Oil merchandise	2021	4525	3845.3	-679.7
19	Crude oil	Oil merchandise	2022	3277.8	2332.6	-945.2
20	Oil products	Oil merchandise	2005	2361.8	3218.6	856.8
21	Oil products	Oil merchandise	2006	2421.6	3319.1	897.5
22	Oil products	Oil merchandise	2007	4475	4756.1	281.1



	A	B	C	D	E	F	G
1	year	base metals	cereals mer	chemicals n	cotton & its	foodstuff me	machinery, i
2	2005	1891	1342.7	1509.2001	769.6	1426.6	887.5
3	2006	2942.0001	1687.5999	2319.3	1042.8	2195.4	1297.3
4	2007	5345.3998	2607.2	3653.7	1511.8	3149.4	2211.3
5	2008	5276.5001	2029.6	3985.5999	1668	3384.1	2158.2
6	2009	4292.6001	2347.1	4011.4	2182.2	3761.8	3172.9
7	2010	4187.8	3740.0999	3856.5	2274.6	4561.7	3408.9999
8	2011	4451.4999	4375.7999	4616.7	2714.4	5405.2	3481.3
9	2012	3859.2999	4051.8999	4357.9999	2690.5	4836.9	3184.5
10	2013	4461	4501.0001	4280.1001	3041.7	4796.6999	2833.3
11	2014	4107.5999	4610.0001	4713.4001	2858.8	4166.7	3760.7
12	2015	3469.3999	4057.5	4774.9	2274.4999	4014.5999	3484.4001
13	2016	3277.1001	4318.0001	4496.1	2133.2	4028.1001	3643.5
14	2017	5059.5999	4147.2	4169.3001	2537.4	4357.8001	3603.9999
15	2018	5000.8001	4514.7001	4889.8999	2796.2001	3972.7	4716.9
16	2019	4120.2	4854.3	4996.1	3034.8	4619.0999	4931.6
17	2020	4583.2001	5628.9001	5680.0001	3096.1999	4823.3	5256.2
18	2021	7007.0002	7398.4	7973.8002	3713.5	6292.2999	5517
19	2022	5115.6	5923.7999	6162.9001	2420.5	4121.3001	4247.5999

Data preprocessing using Python

- 1- Import the **csv** with Pandas Library
- 2- Change **year column datatype** to Datetime
- 3- **Indexing** the Dataframe with year column

```
tsa.ipynb > # Check the size of training data
```

+ Code + Markdown | ▶ Run All ↺ Restart ☒ Clear All Outputs ⓧ Go To | 📄 Variables 📖 Outline ...

```
1 import pandas as pd
2
3 # Load the data
4 data = pd.read_csv(r"C:\Users\Maher\Desktop\New folder\.Project 01\tsa\tests\sectors.csv")
5
6 # Convert 'year' to datetime
7 data['year'] = pd.to_datetime(data['year'], format='%Y')
8 data.set_index('year', inplace=True)
9 data.head()
```

[1] ✓ 0.4s

Checking for stationary

1- Applying the ADFuller Test on columns to check for stationary

2- **Target:** Predicting the values of imports for oil sector for next 3 years

- **P-Value** < 0.05
- **T-stat** < 5% crit value

Which indicate that
Oil sector is stationary

Column	Test Statistic	p-value	Critical Values	Is Stationary
Base Metals & Products	-3.5772	0.0062	1%: -4.3316 5%: -3.2329 10%: -2.7487	True 1
Cereals Merchandise	0.7484	0.9908	1%: -4.2232 5%: -3.1894 10%: -2.7298	False
Chemicals Merchandise	-2.1550	0.2230	1%: -3.8893 5%: -3.0544 10%: -2.6670	False
Cotton & Its Products & Other Textiles	-2.6256	0.0878	1%: -4.3316 5%: -3.2329 10%: -2.7487	False
Foodstuff Merchandise	-1.4309	0.5674	1%: -4.3316 5%: -3.2329 10%: -2.7487	False
Machinery, Appliances, Electric Equipment & Parts Thereof	-2.1411	0.2283	1%: -3.8893 5%: -3.0544 10%: -2.6670	False
Oil Merchandise	-3.3268	0.0137	1%: -4.3316 5%: -3.2329 10%: -2.7487	True 2

***Picking a TSA model**

- **non-integrated models**
Used for stationary data
- **integrated models**
Used for Non-stationary

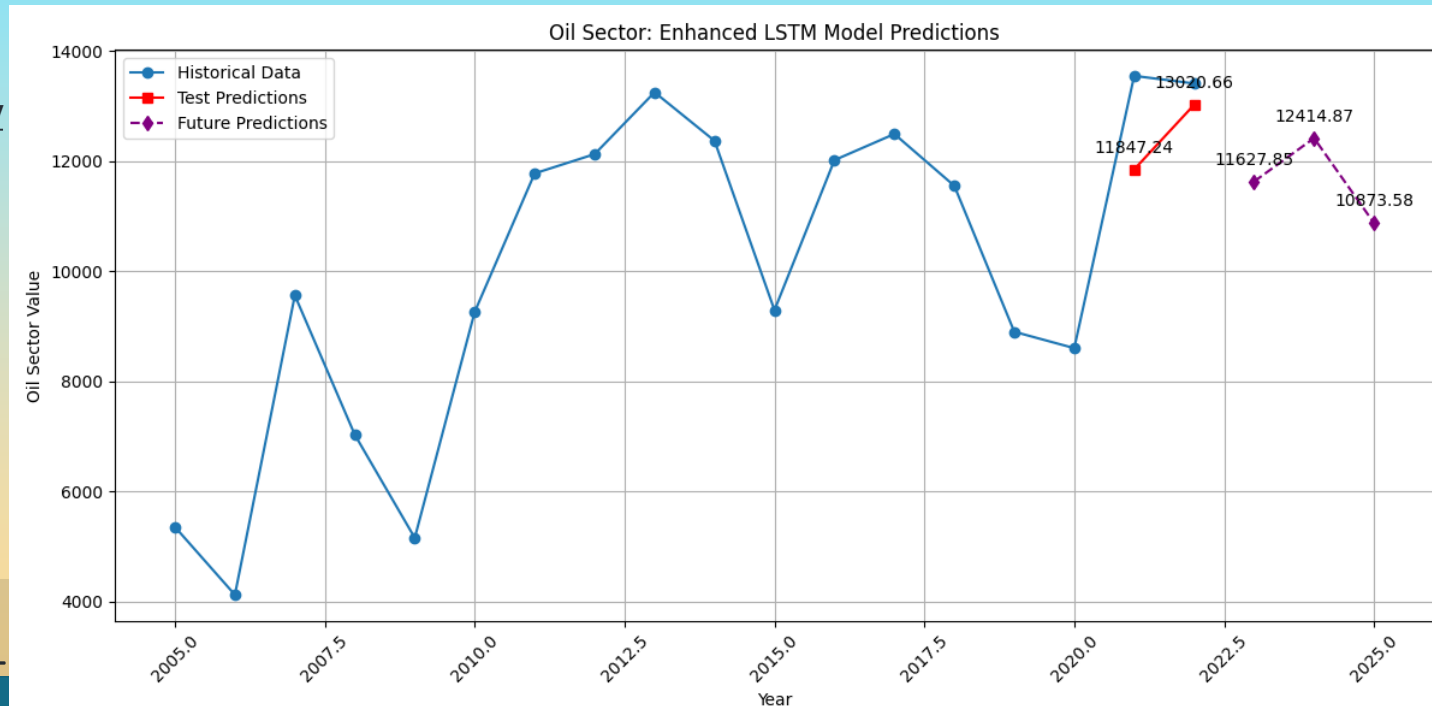
Predictions

1- Due to the short length of the provided data there was no Accurate TSA model could **reliably predict** the testing set

2- We ended Using **Keras** library specifically **LSTM model**

* Predicted Values For Oil Imports next 3y

- **2023 : \$11.62 billion**
will decrease ▼
- **2024 : \$12.41 bn**
slightly increase ▲
- **2025 : \$10.87 bn**
further decrease ▼▼



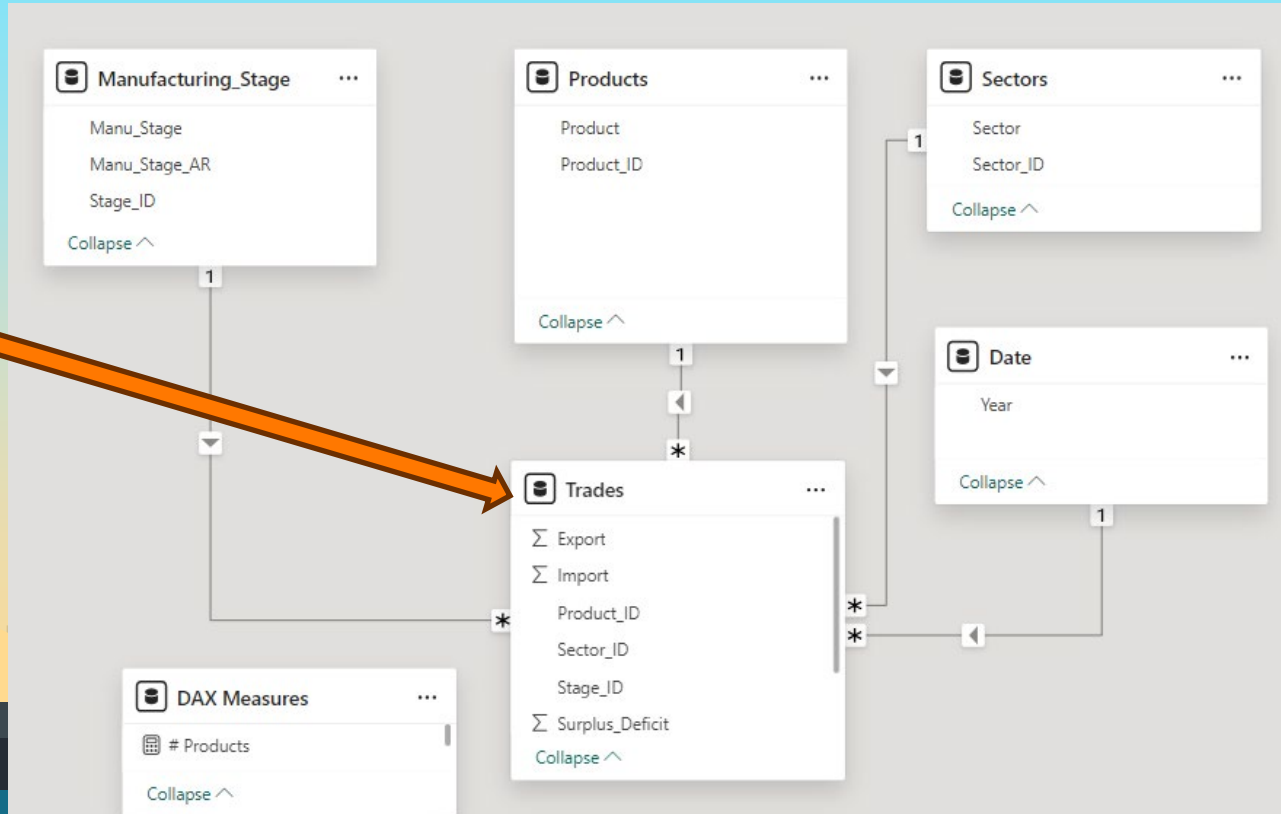
05

Data Visualization



Star Schema Using PowerBI

Trades as
Fact Table



Egypt Trades

(2005 : 2023)

Total Imports

650bn

Total Exports

354bn

Total Surplus /
Deficit

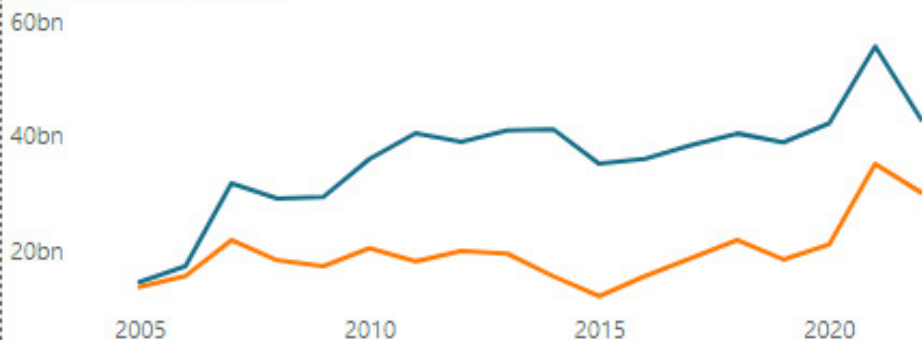
295bn

Year

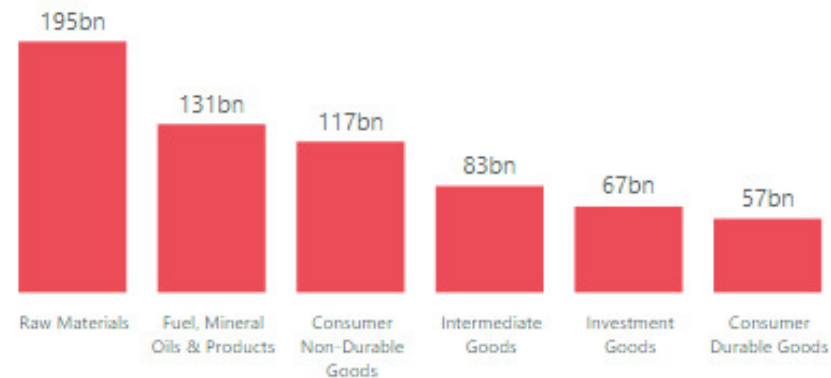
All

Total Imports and Total Exports by Year

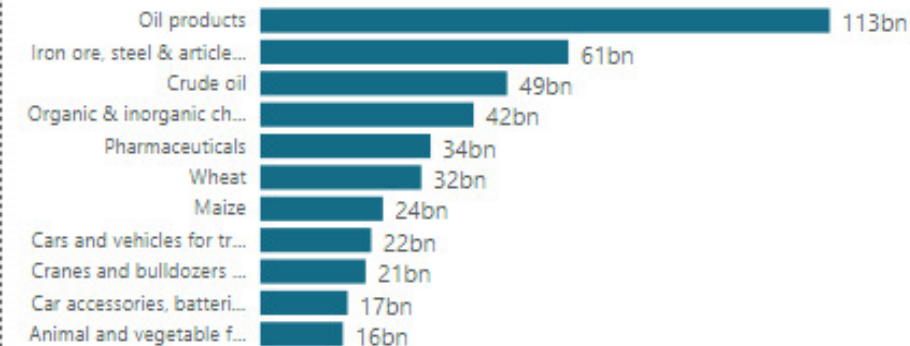
● Total Imports ● Total Exports



Total Imports by Manu_Stage

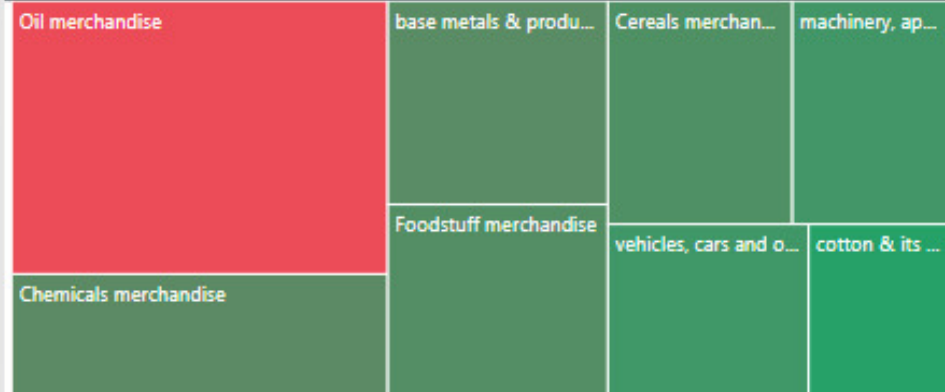


Total Imports by Product



Total Imports

Total Imports by Sector





Products

37

Most Imported Product

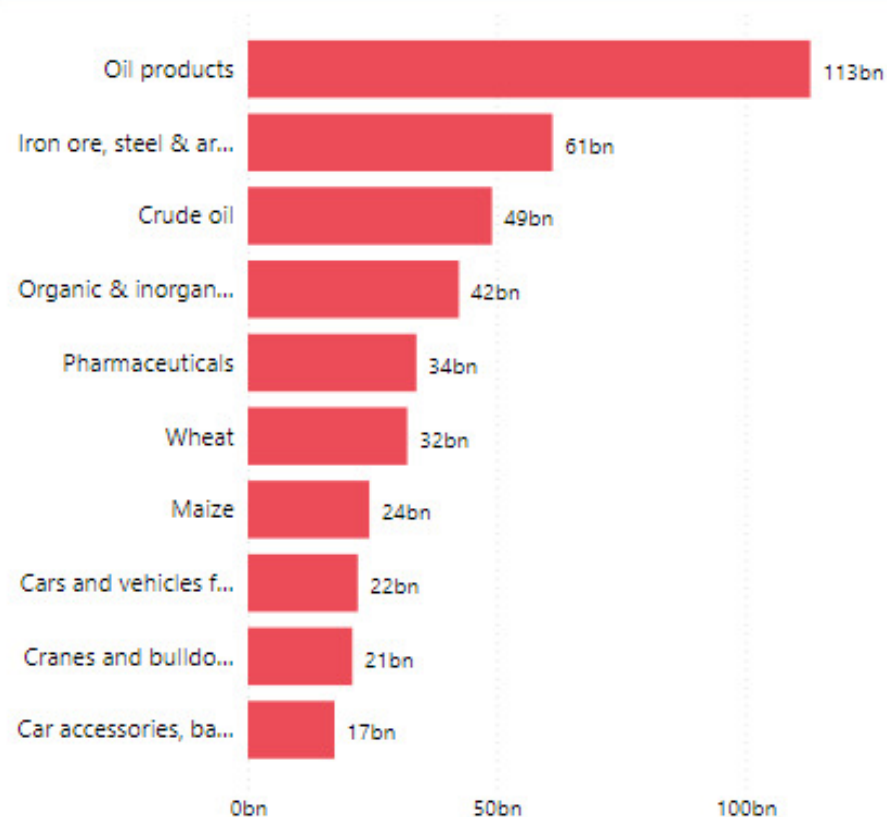
Oil products

113.0bn

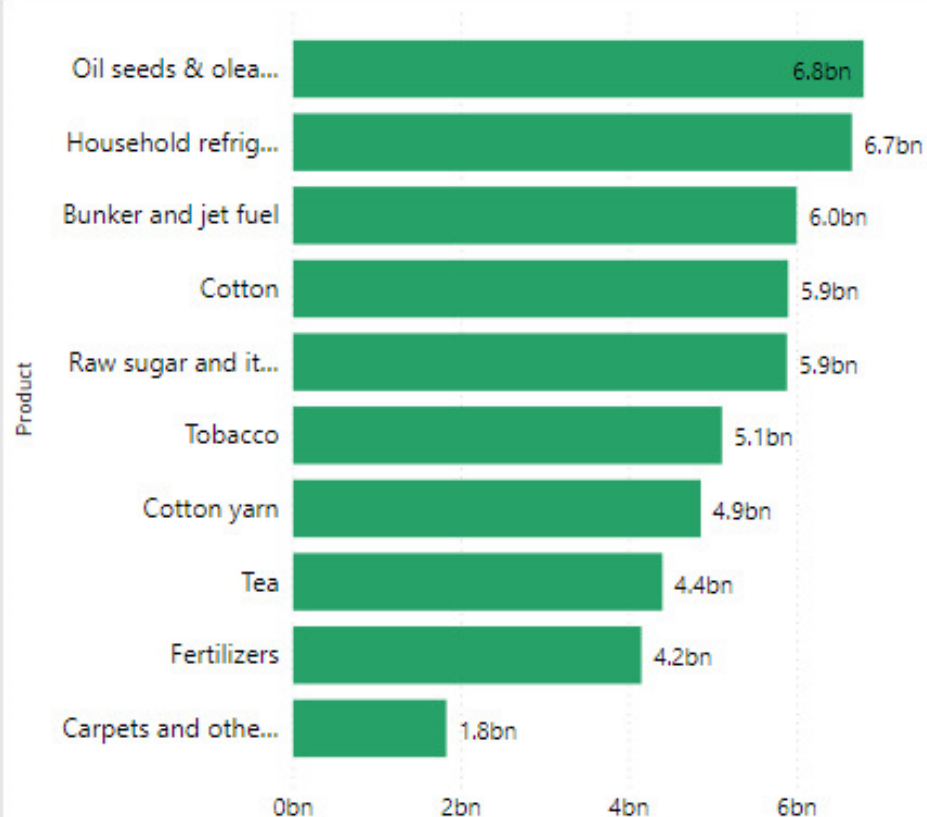
Year

All

Top 10 Importing Products



Bottom 10 Importing Products





Sectors

No of All Sectors

8

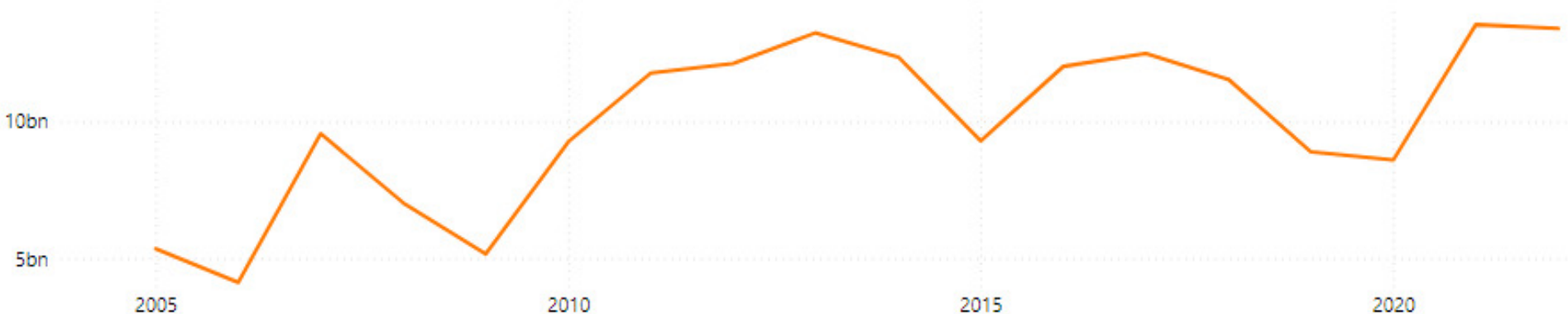
No of All Products

37

Sector	Total Imports
Oil merchandise	179,818,800,338.75
Bunker and jet fuel	6,003,599,960.33
Crude oil	49,055,299,499.51
Natural gas	11,742,899,902.34
Oil products	113,017,000,976.56
Total	179,818,800,338.75

Total Imports by Year and Sector

Sector ● Oil merchandise





Manufacturing Stages

No of All Manufacturing Stages

7

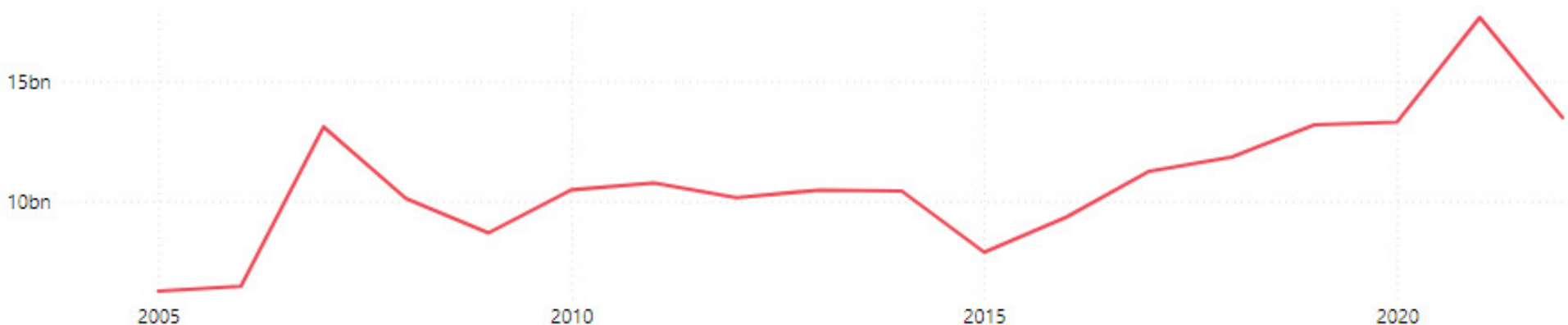
No of All Products

37

Manu_Stage	Total Imports
<input checked="" type="checkbox"/> Raw Materials	194,982,199,508.67
Aluminum ore and its articles	7,925,600,036.62
Copper ore and its articles	9,314,300,003.05
Cotton	5,902,199,905.40
Crude oil	49,055,299,499.51
Iron ore, steel & articles thereof	61,207,699,951.17
Maize	24,424,000,244.14
Total	194,982,199,508.67

Total Imports by Year and Manu_Stage

Manu_Stage ● Raw Materials



06

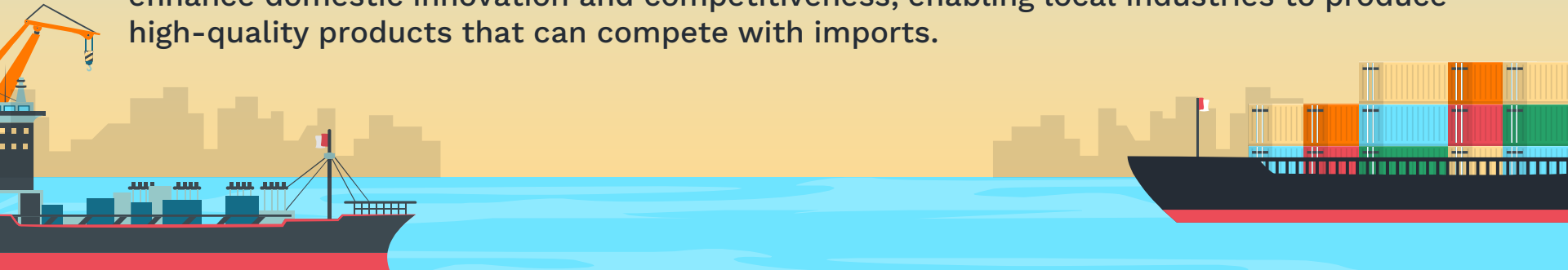
Recommendations and solutions study



Recommendations for Policymakers

- Promoting Domestic Production:

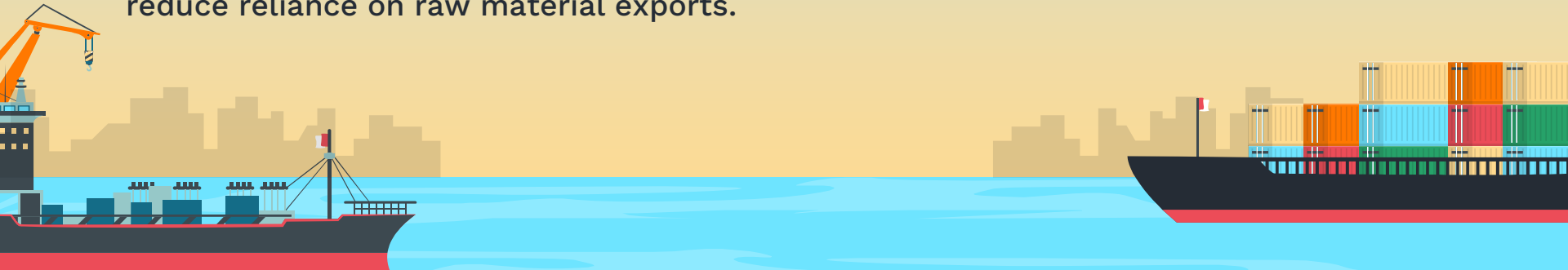
- 1- Provide Targeted Incentives: Offer tax breaks, subsidies, and other incentives to encourage domestic production of key imported goods, such as food, pharmaceuticals, and manufacturing inputs.
- 2- Improve Business Environment: Simplify regulatory procedures, reduce bureaucratic hurdles, and provide access to affordable financing to facilitate domestic investment and entrepreneurship.
- 3- Invest in Research and Development: Support research and development activities to enhance domestic innovation and competitiveness, enabling local industries to produce high-quality products that can compete with imports.



Recommendations for Policymakers

- Agricultural Development:

- 4- Modernize Farming Practices: Promote the adoption of modern farming techniques, such as precision agriculture and sustainable farming methods, to increase yields and reduce reliance on imported inputs.
- 5- Invest in Irrigation Systems: Improve irrigation infrastructure to ensure adequate water supply for agriculture, especially in arid regions.
- 6- Support Value-Added Agriculture: Encourage the development of value-added agricultural industries, such as food processing and packaging, to increase domestic value-capture and reduce reliance on raw material exports.



Recommendations for Policymakers

- Industrial Development:

- 4- Attract Foreign Investment: Create a favorable investment climate to attract foreign direct investment (FDI) in manufacturing and other sectors. This can involve providing tax incentives, infrastructure support, and a skilled workforce.
- 5- Promote Industrial Clusters: Develop industrial clusters to foster collaboration, knowledge sharing, and economies of scale among domestic firms.
- 6- Enhance Technical Skills: Invest in vocational training and education to equip the workforce with the skills needed to meet the demands of modern industries.



Thanks!

Do you have any questions?
Feel free to ask!

