📊 Orders Data Analysis & Insights

Welcome to this notebook!
Here we explore and analyze the **Orders dataset** located at:

📁 `Data/Raw_Data/Orders.csv`

This notebook is designed as an **end-to-end data analysis pipeline**, starting from raw data ingestion all the way to clean, insight-driven visualizations that support business decision-making.

🎯 Objectives

By the end of this analysis, we aim to:

- 🧹 Clean and preprocess raw order data using reproducible steps
- 📈 Perform Exploratory Data Analysis (EDA) to uncover patterns and trends
- 🌍 Identify top-performing countries and markets
- 🛒 Analyze revenue and quantity by **category** and **item**
- 💾 Export a final, analysis-ready dataset to:
  `Data/Cleaned_Data/Cleaned_Orders.csv`

🧠 What You'll Find Inside

This notebook includes:

- ✅ A transparent and reusable **data cleaning pipeline**
- 📋 Summary tables for sales and quantities
- 📊 Clear and insightful visualizations
- 💡 Actionable business insights derived from real data

All steps are structured to make the analysis easy to understand, modify, and re-run when new data arrives.

✨ *Built with clarity, reusability, and insight in mind.*

Setup

import libraries

In [22]:
```python
import pandas as pd
import matplotlib.pyplot as plt
```

Fetch Data

In [23]:
```python
df = pd.read_csv(r'./Data/Raw_Data/Orders.csv')
df
```

Out[23]:

	Date:	28/9/2023	Unnamed: 2	Unnamed: 3	Unnamed: 4	Unnamed: 5	Unnamed: 6	Unna
0	Time	5:22 PM	NaN	NaN	NaN	NaN	NaN	
1	NaN	NaN	NaN	NaN	NaN	NaN	NaN	
2	NaN	NaN	NaN	NaN	NaN	NaN	NaN	
3	Order ID	Order Date	Country	City	Branch	Lat	Lng	Custo First N
4	1	1/1/2023	Syria	homs	hs01	34.7326	36.7136	
...	...	...	...	...	...	...	...	
20003	19996	1/9/2023	Morocco	casablanca	cs01	33.5731	7.5898	ah
20004	19997	1/9/2023	Syria	homs	hs01	34.7326	36.7136	
20005	19998	1/9/2023	USA	las vegas	lv01	36.1699	-115.1398	hu
20006	19999	1/9/2023	Saudi Arabia	jeddah	jd03	21.4858	39.1925	
20007	20000	1/9/2023	USA	washington	wh01	38.9072	-77.0369	ah

20008 rows × 19 columns

Data Cleaning

Quick Explore

In [24]:
```python
df.head(10)
```

Out[24]:

	Date:	28/9/2023	Unnamed: 2	Unnamed: 3	Unnamed: 4	Unnamed: 5	Unnamed: 6	Unnamed: 7
0	Time	5:22 PM	NaN	NaN	NaN	NaN	NaN	NaN
1	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN
2	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN
3	Order ID	Order Date	Country	City	Branch	Lat	Lng	Customer First Name
4	1	1/1/2023	Syria	homs	hs01	34.7326	36.7136	lina
5	2	1/1/2023	Saudi Arabia	riyadh	rd01	24.7136	46.6753	omar
6	3	1/1/2023	Saudi Arabia	riyadh	rd03	24.7743	46.7386	iman
7	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN
8	4	1/1/2023	United Arab Emirates	abu dhabi	ad01	24.4539	54.3773	ahmad
9	5	1/1/2023	USA	washington	wh01	38.9072	-77.0369	sami

In [25]:

```
df.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 20008 entries, 0 to 20007
Data columns (total 19 columns):
 #   Column       Non-Null Count  Dtype 
---  ------       --------------  ----- 
 0   Date:        20002 non-null  object
 1   28/9/2023    20002 non-null  object
 2   Unnamed: 2   20001 non-null  object
 3   Unnamed: 3   20001 non-null  object
 4   Unnamed: 4   20001 non-null  object
 5   Unnamed: 5   20001 non-null  object
 6   Unnamed: 6   20001 non-null  object
 7   Unnamed: 7   20001 non-null  object
 8   Unnamed: 8   20001 non-null  object
 9   Unnamed: 9   20001 non-null  object
 10  Unnamed: 10  20001 non-null  object
 11  Unnamed: 11  20001 non-null  object
 12  Unnamed: 12  20001 non-null  object
 13  Unnamed: 13  20001 non-null  object
 14  Unnamed: 14  20001 non-null  object
 15  Unnamed: 15  20001 non-null  object
 16  Unnamed: 16  20001 non-null  object
 17  Unnamed: 17  18890 non-null  object
 18  Unnamed: 18  20001 non-null  object
dtypes: object(19)
memory usage: 2.9+ MB
```

Fix Data Columns and Index

In [26]:
```
df.drop(range(3),inplace=True)
df.reset_index(inplace=True,drop=True)
df.columns = df.iloc[0]
df.reset_index(inplace=True,drop=True)
df.drop(0,inplace=True)
df.reset_index(inplace=True,drop=True)
df.columns = df.columns.str.strip()
```

Missing Values Handling

In [27]:
```
df.dropna(how="all",inplace=True)
df.isna().sum()
```

```
Out[27]: 0
         Order ID                 0
         Order Date               0
         Country                  0
         City                     0
         Branch                   0
         Lat                      0
         Lng                      0
         Customer First Name      0
         Customer Last Name       0
         Email                    0
         Phone Number             0
         Category                 0
         Sub Category             0
         Item                     0
         SalesPerson ID           0
         Quantity                 0
         Unit Price               0
         Discount              1111
         Status                   0
         dtype: int64
```

```
In [28]: df.fillna(0,inplace=True)
         df.isna().sum()
```

```
Out[28]: 0
         Order ID              0
         Order Date            0
         Country               0
         City                  0
         Branch                0
         Lat                   0
         Lng                   0
         Customer First Name   0
         Customer Last Name    0
         Email                 0
         Phone Number          0
         Category              0
         Sub Category          0
         Item                  0
         SalesPerson ID        0
         Quantity              0
         Unit Price            0
         Discount              0
         Status                0
         dtype: int64
```

Data Types Conversion

```
In [29]: df['Quantity'] = df['Quantity'].astype(int)
         df['Unit Price'] = df['Unit Price'].astype(float)
         df['Discount'] = df['Discount'].astype(float)
```

Transforming Data

```
In [30]: df['Phone Number'] = df['Phone Number'].str.replace("Tel:","")
         df['Phone Number'] = df['Phone Number'].apply(lambda x: x[0:4]+"-"+x[4:8]+"-"+x[8:]
```

```
In [31]: df['Customer First Name'] = df['Customer First Name'].str.capitalize()
         df['Customer Last Name'] = df['Customer Last Name'].str.capitalize()
         df['Customer First Name'] = df["Customer First Name"] + ' ' + df['Customer Last Nam
         df.drop(columns="Customer Last Name",inplace=True)
         df = df.rename(columns={"Customer First Name":"Full Name"})
```

```
In [32]: df['Unit Price'] = df['Unit Price'].abs()
         df['Discount'] = ((df['Discount'] / df['Unit Price']) * 100).round(2)
         df['Total Price'] = (df["Quantity"] * (1 - df['Discount'] / 100) * df["Unit Price"]
         df.insert(17, 'Total Price', df.pop('Total Price'))
         df['Total Price'] = df['Total Price'].round()
```

```
In [33]: df['Email'] = df['Email'].str.replace(r'@', '@g', regex=True)
         df['Email'] = df['Email'].str.replace(r'\.', '', regex=True)
         df['Email'] = df['Email'].str.lower()
         df
```

Out[33]:

	Order ID	Order Date	Country	City	Branch	Lat	Lng	Full Name	
0	1	1/1/2023	Syria	homs	hs01	34.7326	36.7136	Lina Alrrashid	linaal
1	2	1/1/2023	Saudi Arabia	riyadh	rd01	24.7136	46.6753	Omar Eurul	om
2	3	1/1/2023	Saudi Arabia	riyadh	rd03	24.7743	46.7386	Iman Iismaeil	imani
4	4	1/1/2023	United Arab Emirates	abu dhabi	ad01	24.4539	54.3773	Ahmad Rihan	ahma
5	5	1/1/2023	USA	washington	wh01	38.9072	-77.0369	Sami Altawil	sam
...	...	...	...	...	...	...	...	...	
19999	19996	1/9/2023	Morocco	casablanca	cs01	33.5731	7.5898	Ahmad Iad	ahı
20000	19997	1/9/2023	Syria	homs	hs01	34.7326	36.7136	Ali Kiali	
20001	19998	1/9/2023	USA	las vegas	lv01	36.1699	-115.1398	Husayn Salayk	husayı
20002	19999	1/9/2023	Saudi Arabia	jeddah	jd03	21.4858	39.1925	Fatin Bahriin	fatin
20003	20000	1/9/2023	USA	washington	wh01	38.9072	-77.0369	Ahmad Shakur	ahmac

20000 rows × 19 columns

In [34]:

```
df['City'] = df['City'].str.capitalize()
df
```

Out[34]:

	Order ID	Order Date	Country	City	Branch	Lat	Lng	Full Name	
0	1	1/1/2023	Syria	Homs	hs01	34.7326	36.7136	Lina Alrrashid	linaa
1	2	1/1/2023	Saudi Arabia	Riyadh	rd01	24.7136	46.6753	Omar Eurul	om
2	3	1/1/2023	Saudi Arabia	Riyadh	rd03	24.7743	46.7386	Iman Iismaeil	iman
4	4	1/1/2023	United Arab Emirates	Abu dhabi	ad01	24.4539	54.3773	Ahmad Rihan	ahm
5	5	1/1/2023	USA	Washington	wh01	38.9072	-77.0369	Sami Altawil	sam
...	...	...	...	...	...	...	...	...	
19999	19996	1/9/2023	Morocco	Casablanca	cs01	33.5731	7.5898	Ahmad Iad	ah
20000	19997	1/9/2023	Syria	Homs	hs01	34.7326	36.7136	Ali Kiali	
20001	19998	1/9/2023	USA	Las vegas	lv01	36.1699	-115.1398	Husayn Salayk	husay
20002	19999	1/9/2023	Saudi Arabia	Jeddah	jd03	21.4858	39.1925	Fatin Bahriin	fatir
20003	20000	1/9/2023	USA	Washington	wh01	38.9072	-77.0369	Ahmad Shakur	ahmac

20000 rows × 19 columns

In [35]:
```
df['Status'] = df['Status'].str.capitalize()
df
```

Out[35]:

	Order ID	Order Date	Country	City	Branch	Lat	Lng	Full Name	
0	1	1/1/2023	Syria	Homs	hs01	34.7326	36.7136	Lina Alrrashid	linaa
1	2	1/1/2023	Saudi Arabia	Riyadh	rd01	24.7136	46.6753	Omar Eurul	om
2	3	1/1/2023	Saudi Arabia	Riyadh	rd03	24.7743	46.7386	Iman Iismaeil	iman
4	4	1/1/2023	United Arab Emirates	Abu dhabi	ad01	24.4539	54.3773	Ahmad Rihan	ahm
5	5	1/1/2023	USA	Washington	wh01	38.9072	-77.0369	Sami Altawil	sam
...	...	...	...	...	...	...	...	...	
19999	19996	1/9/2023	Morocco	Casablanca	cs01	33.5731	7.5898	Ahmad Iad	ah
20000	19997	1/9/2023	Syria	Homs	hs01	34.7326	36.7136	Ali Kiali	
20001	19998	1/9/2023	USA	Las vegas	lv01	36.1699	-115.1398	Husayn Salayk	husay
20002	19999	1/9/2023	Saudi Arabia	Jeddah	jd03	21.4858	39.1925	Fatin Bahriin	fatir
20003	20000	1/9/2023	USA	Washington	wh01	38.9072	-77.0369	Ahmad Shakur	ahmad

20000 rows × 19 columns

Export Cleaned Data

Final Check

In [36]:

```
df.head(10)
```

Out[36]:

	Order ID	Order Date	Country	City	Branch	Lat	Lng	Full Name	
0	1	1/1/2023	Syria	Homs	hs01	34.7326	36.7136	Lina Alrrashid	linaa
1	2	1/1/2023	Saudi Arabia	Riyadh	rd01	24.7136	46.6753	Omar Eurul	on
2	3	1/1/2023	Saudi Arabia	Riyadh	rd03	24.7743	46.7386	Iman Iismaeil	imar
4	4	1/1/2023	United Arab Emirates	Abu dhabi	ad01	24.4539	54.3773	Ahmad Rihan	ahm
5	5	1/1/2023	USA	Washington	wh01	38.9072	-77.0369	Sami Altawil	san
6	6	1/1/2023	Syria	Aleppo	al01	36.2021	37.1343	Ahed Salim	ah
7	7	1/1/2023	Saudi Arabia	Riyadh	rd01	24.7136	46.6753	Amira Alrahil	ami
9	8	1/1/2023	Egypt	Cairo	cr02	30.0444	31.2357	Muhamad Bitahish	muhamad
10	9	1/1/2023	Saudi Arabia	Aseer	as01	18.2311	42.5004	Fadi Aljabaan	fadi
11	10	1/1/2023	USA	Washington	wh01	38.9072	-77.0369	Zahir Almunajid	zahiral

Export

In [37]:
```
df.to_csv(r'./Data/Cleaned_Data/Cleaned_Orders.csv',index=False)
```

EDA

In [38]:
```
df
```

Out[38]:

	Order ID	Order Date	Country	City	Branch	Lat	Lng	Full Name	
0	1	1/1/2023	Syria	Homs	hs01	34.7326	36.7136	Lina Alrrashid	linaa
1	2	1/1/2023	Saudi Arabia	Riyadh	rd01	24.7136	46.6753	Omar Eurul	om
2	3	1/1/2023	Saudi Arabia	Riyadh	rd03	24.7743	46.7386	Iman Iismaeil	iman
4	4	1/1/2023	United Arab Emirates	Abu dhabi	ad01	24.4539	54.3773	Ahmad Rihan	ahm
5	5	1/1/2023	USA	Washington	wh01	38.9072	-77.0369	Sami Altawil	sam
...	...	...	...	...	...	...	...	...	
19999	19996	1/9/2023	Morocco	Casablanca	cs01	33.5731	7.5898	Ahmad Iad	ah
20000	19997	1/9/2023	Syria	Homs	hs01	34.7326	36.7136	Ali Kiali	
20001	19998	1/9/2023	USA	Las vegas	lv01	36.1699	-115.1398	Husayn Salayk	husay
20002	19999	1/9/2023	Saudi Arabia	Jeddah	jd03	21.4858	39.1925	Fatin Bahriin	fatir
20003	20000	1/9/2023	USA	Washington	wh01	38.9072	-77.0369	Ahmad Shakur	ahmac

20000 rows × 19 columns

In [39]:

```
df.info()
```

```
<class 'pandas.core.frame.DataFrame'>
Index: 20000 entries, 0 to 20003
Data columns (total 19 columns):
 #   Column          Non-Null Count  Dtype  
---  ------          --------------  -----  
 0   Order ID        20000 non-null  object 
 1   Order Date      20000 non-null  object 
 2   Country         20000 non-null  object 
 3   City            20000 non-null  object 
 4   Branch          20000 non-null  object 
 5   Lat             20000 non-null  object 
 6   Lng             20000 non-null  object 
 7   Full Name       20000 non-null  object 
 8   Email           20000 non-null  object 
 9   Phone Number    20000 non-null  object 
 10  Category        20000 non-null  object 
 11  Sub Category    20000 non-null  object 
 12  Item            20000 non-null  object 
 13  SalesPerson ID  20000 non-null  object 
 14  Quantity        20000 non-null  int64  
 15  Unit Price      20000 non-null  float64
 16  Discount        20000 non-null  float64
 17  Total Price     20000 non-null  float64
 18  Status          20000 non-null  object 
dtypes: float64(3), int64(1), object(15)
memory usage: 3.1+ MB
```

In [44]:
```
df.describe(include=['number'])
```

Out[44]:

	Quantity	Unit Price	Discount	Total Price
count	20000.000000	20000.000000	20000.000000	20000.000000
mean	1.936750	609.292000	10.079300	896.527250
std	2.288736	617.976051	15.027555	1444.145749
min	1.000000	29.000000	0.000000	-7796.000000
25%	1.000000	179.000000	3.000000	195.000000
50%	1.000000	399.000000	6.000000	469.000000
75%	2.000000	899.000000	10.000000	1047.250000
max	13.000000	3999.000000	130.000000	31992.000000

In [45]:
```
print("-"*50)
print(df.shape)
print("-"*50)
print(df.columns)
print("-"*50)
```

```
--------------------------------------------------
(20000, 19)
--------------------------------------------------
Index(['Order ID', 'Order Date', 'Country', 'City', 'Branch', 'Lat', 'Lng',
       'Full Name', 'Email', 'Phone Number', 'Category', 'Sub Category',
       'Item', 'SalesPerson ID', 'Quantity', 'Unit Price', 'Discount',
       'Total Price', 'Status'],
      dtype='object', name=0)
--------------------------------------------------
```

In [46]:
```python
print(df['Status'].unique())
print("-"*50)
print(df['Category'].unique())
print("-"*50)
print(df['Sub Category'].unique())
print("-"*50)
print(df['Item'].unique())
print("-"*50)
```

```
['False' 'True']
--------------------------------------------------
['Tablet' 'Smartphone' 'Digital Camera' 'Headphones' 'Smartwatch' 'Laptop'
 'Smart Speaker' 'VR Headset' 'Fitness Tracker' 'Gaming Console']
--------------------------------------------------
['Apple iPad' 'Samsung Galaxy' 'Panasonic Lumix' 'Samsung Galaxy Tab'
 'Sennheiser HD' 'Garmin Fenix' 'Anker Soundcore' 'HP Envy'
 'Apple HomePod' 'Lenovo Legion' 'Fossil Gen' 'Amazon Fire' 'Lenovo Tab'
 'Oculus Rift' 'Sony Cyber-shot' 'JBL Live' 'Sony WH' 'Apple MacBook'
 'OnePlus' 'Fitbit Versa' 'Fujifilm X Series' 'Samsung Galaxy Tab S'
 'Huawei Watch' 'Bose QuietComfort' 'Xiaomi Mi' 'Pimax Vision' 'ASUS ROG'
 'Sony Alpha' 'Xiaomi Redmi' 'Garmin Vivosmart' 'HP Reverb G2 Omnicept'
 'JBL Link' 'Withings Move' 'Garmin Venu' 'Sony PlayStation' 'Google Nest'
 'Amazon Fire HD' 'Valve Index' 'HTC Vive' 'HP Pavilion' 'Sonos One'
 'Microsoft Surface' 'Nikon Coolpix' 'Amazon Echo' 'Lenovo ThinkPad'
 'Garmin Approach' 'Amazfit GTR' 'Harman Kardon' 'Garmin Forerunner'
 'Apple iPhone' 'Oculus Rift S' 'Microsoft Xbox' 'Google Pixel'
 'Oculus Quest' 'Huawei Band' 'HTC Vive Pro' 'Nintendo Switch' 'Dell XPS'
 'Bose SoundSport' 'Nikon Z Series' 'Fitbit Charge' 'Olympus OM-D'
 'Acer Swift' 'Jabra Elite' 'Apple Watch' 'Retro Console' 'Apple iPad Pro'
 'Canon EOS' 'Samsung Gear' 'Google Nest Hub' 'HP Reverb'
 'Canon EOS R Series' 'Amazon Echo Show' 'Oppo Find' 'Bose Home Speaker'
 'Xiaomi Mi Band' 'Samsung Odyssey' 'Amazfit Bip']
--------------------------------------------------
['  iPad   Pro   12.9" ' 'Galaxy  S21  Ultra  ' 'Panasonic Lumix GH5 '
 ' Galaxy Tab A8 ' ' Sennheiser   HD   450BT  ' ' Garmin   Fenix   6S   '
 'Panasonic Lumix S1H' 'Anker   Soundcore   Liberty   Air   2   Pro   '
 '  Envy   x360   ' 'Apple  HomePod  mini ' ' Lenovo   Legion   5  '
 '   Galaxy  Tab  S7' '  Fossil Gen 5E  ' ' Garmin   Fenix   7'
 '   Amazon Fire 7 ' '  Galaxy  Tab  A7' ' Sennheiser HD 660S '
 'Lenovo Tab M10 FHD Plus   ' 'Oculus  Rift  S   '
 ' Anker Soundcore Life Q35  ' 'Sony  Cyber-shot  RX100  VII   '
 '   JBL Live 500BT ' ' Sony   WH-CH710N   '
 'Anker Soundcore Liberty Air Pro' 'Lenovo   Legion   5 '
 '   MacBook   Air   13"   ' '  Amazon Fire HD 10   '
 ' OnePlus  10  Pro  ' 'Fitbit Versa 2  ' '  Fitbit  Versa  3 '
 'Galaxy S21 Ultra' 'Sennheiser HD 599 SE' 'Fujifilm X-T4'
 'Galaxy Tab S7+' 'Huawei Watch Fit 2 Pro' 'QC35 II' 'Xiaomi Mi 12'
 'Pimax Vision 5K Super Plus' 'ASUS ROG Strix Scar 17' 'Sony Alpha A6400'
 'MacBook Pro 16"' 'Huawei Watch GT 3 Pro' 'Xiaomi Redmi 10'
 'Garmin Vivosmart 4' 'ASUS ROG Zephyrus G14' 'HP Reverb G2 Omnicept'
 'JBL Link 20' 'Galaxy Watch Active 2' 'Withings Move' 'Garmin Venu 2S'
 'PlayStation 4 Pro' 'Galaxy Tab S7' 'OnePlus 10 Pro' 'Nest Audio'
 'Amazon Fire HD 8 Plus' 'Valve Index VR Kit 2' 'HTC Vive Cosmos Elite'
 'Xiaomi Redmi Note 11 Pro' 'HP Pavilion x360' 'Sonos Move'
 'Amazon Fire 7' 'Surface Laptop 4' 'Nikon Coolpix P1000' 'OnePlus Nord 2'
 'Echo Dot (4th Gen)' 'Sennheiser HD 800 S' 'ThinkPad X13'
 'Garmin Approach S12' 'Galaxy Tab A7' 'HTC Vive Cosmos' 'Oculus Rift S'
 'Amazfit GTR 3' 'Harman Kardon Citation' 'Garmin Forerunner 945'
 'Apple HomePod' 'iPhone SE' 'PlayStation 5' 'iPhone 12' 'Oculus Rift 2'
 'Xbox Series S' 'ThinkPad X1 Carbon' 'iPad Air' 'Google Pixel 5a'
 'Apple HomePod mini' 'PlayStation 3' 'Fitbit Versa 3'
 'Anker Soundcore Liberty Air 2 Pro' 'Oculus Quest 2 (256GB)'
 'Huawei Band 4 Pro' 'Harman Kardon Allure' 'Fossil Gen 5E'
 'Google Pixel 6 Pro' 'HTC Vive Pro 2' 'Nintendo Switch OLED Pro'
 'PlayStation 3 Slim' 'Xbox One X' 'Galaxy M32' 'XPS 15' 'Surface Go 2'
 'MacBook Air 13"' 'Bose SoundSport Free' 'HP Pavilion 15' 'Sonos One SL'
 'Garmin Approach S62' 'Nikon Z50' 'Fitbit Charge 4'
 'Olympus OM-D E-M1 Mark III' 'Fossil Gen 6' 'Fitbit Charge 3'
 'Sony Cyber-shot RX100 VII' 'Acer Swift 3' 'Nintendo Switch Pro'
 'Garmin Fenix 7' 'Garmin Forerunner 55' 'Xbox 360' 'OnePlus 9 Pro'
 'Echo Show 8' 'Galaxy Tab A8' 'Jabra Elite 85t' 'Apple Watch SE'
 'Lenovo Legion 5' 'Lenovo Legion 7i' 'Jabra Elite 75t' 'Oculus Quest 3'
 'Nikon Z7 II' 'iPad Pro 12.9"' 'Super NES Classic' 'Fujifilm X100V'
 'PlayStation VR' 'Apple Watch Series 7' 'Oculus Quest 2 (64GB)' 'XPS 13'
 'iPad Pro 11" (5th Gen)' 'Fitbit Versa 2' 'iPhone 13 Pro Max'
 'Canon EOS M50 Mark II' 'Nikon Coolpix B500' 'Lenovo Tab P11 Plus'
 'Samsung Gear S4' 'Anker Soundcore Life Q35' 'Garmin Vivosmart HR' 'QC45'
 'Google Nest Hub Max' 'JBL Live 650BTNC' 'Nintendo Switch OLED'
 'Samsung Gear Fit 4' 'HTC Vive Focus 3' 'Acer Swift 5' 'HP Reverb G2'
 'JBL Link 500' 'Canon EOS R5' 'Amazon Echo Show 8 (2nd Gen)'
 'Galaxy Z Fold 3' 'Nintendo Switch Lite' 'Nest Hub (2nd Gen)'
 'Xbox Original' 'Anker Soundcore Life Q30' 'PlayStation 2'
 'Galaxy Watch 4' 'Pimax Vision 5K Super' 'Valve Index VR Kit'
 'Huawei Watch GT 2e' 'Sega Genesis Mini' 'Huawei Band 6' 'Sony WH-CH710N'
 'Oppo Find X4 Neo' 'ASUS ROG Strix G15' 'Xbox Series X' 'Amazfit GTR 2e'
 'PlayStation 4 Slim' 'Sennheiser HD 660S' 'Lenovo Tab M10 FHD Plus'
 'Galaxy Tab S8+' 'Bose Home Speaker 300' 'Lenovo Tab M7'
 'Bose SoundSport Wireless' 'Garmin Fenix 6S' 'Xiaomi Mi Band 5'
 'Envy x360' 'Oppo Find X4 Pro' 'Lenovo Tab P11 Pro' 'JBL Live 500BT'
 'Withings Move ECG' 'Sony Cyber-shot HX99' 'Galaxy A52'
 'Xiaomi Mi Band 6' 'Amazon Fire HD 10' 'Panasonic Lumix GH5'
 'HTC Vive Pro' 'Sennheiser HD 450BT' 'Samsung Odyssey G9' 'Canon EOS R6'
 'OnePlus Nord CE 5G' 'Surface Pro 7' 'Huawei Watch GT 3' 'Galaxy A72'
 'Xiaomi Mi 11 Lite' 'Sony Alpha A7 III' 'ASUS ROG Flow Z13'
 'PlayStation 4' 'Google Nest Hub (2nd Gen)' 'iPad Pro 12.9" (5th Gen)'
 'Surface Book 3' 'Bose Home Speaker 500' 'Amazon Fire HD 8'
 'Amazfit Bip U Pro' 'Pimax Vision 8KX' 'Galaxy Tab S8' 'Envy 15'
 'Sony WH-1000XM4' 'Amazon Echo Show 10 (3rd Gen)' 'Amazfit Bip S'
 'Garmin Venu 2' 'Panasonic Lumix ZS200' 'Canon EOS R']
--------------------------------------------------
```

Aggregation and Grouping

In [49]:
```python
# agg_df = the orders has been delivered
agg_df = df[df['Status'] == "True"][["Country", "Category", "Sub Category", "Item",
agg_df.info()
```

```
<class 'pandas.core.frame.DataFrame'>
Index: 14013 entries, 1 to 20003
Data columns (total 7 columns):
 #   Column        Non-Null Count  Dtype  
---  ------        --------------  -----  
 0   Country       14013 non-null  object 
 1   Category      14013 non-null  object 
 2   Sub Category  14013 non-null  object 
 3   Item          14013 non-null  object 
 4   Quantity      14013 non-null  int64  
 5   Unit Price    14013 non-null  float64
 6   Total Price   14013 non-null  float64
dtypes: float64(2), int64(1), object(4)
memory usage: 875.8+ KB
```

In [50]:
```python
top_country_ordered = agg_df.groupby(['Country']).agg({"Quantity":["sum"]})
top_country_ordered.sort_values(by=("Quantity", "sum"),ascending=False)
```

Out[50]:

	Quantity
	sum
Country	
Saudi Arabia	8298
USA	5850
United Arab Emirates	3869
Syria	3502
Egypt	3278
France	1526
Morocco	877

In [51]:
```python
top_country_paid = agg_df.groupby(['Country']).agg({"Total Price":["sum"]})
top_country_paid.sort_values(by=("Total Price", "sum"),ascending=False)
```

Out[51]:

	Total Price
	sum
Country	
Saudi Arabia	3821753.0
USA	2764045.0
United Arab Emirates	1701035.0
Syria	1569260.0
Egypt	1526289.0
France	730478.0
Morocco	404978.0

In [52]:
```
# most category paid and ordered
agg_df.groupby("Category").sum(numeric_only=True)
```

Out[52]:

	Quantity	Unit Price	Total Price
Category			
Digital Camera	2508	2073808.0	2911441.0
Fitness Tracker	2620	172242.0	252816.0
Gaming Console	2751	376134.0	552555.0
Headphones	2697	362531.0	528883.0
Laptop	3222	2025155.0	3091559.0
Smart Speaker	2531	252291.0	356713.0
Smartphone	2718	999473.0	1460660.0
Smartwatch	2634	438410.0	645424.0
Tablet	2810	728992.0	1042454.0
VR Headset	2709	1122681.0	1675333.0

In [53]:
```
country_category_sales = agg_df.groupby(["Country","Category"]).sum(numeric_only=Tr
country_category_sales.sort_values(by="Total Price",ascending=False)
```

Out[53]:

Country	Category	Quantity	Unit Price	Total Price
Saudi Arabia	**Laptop**	983	624685.0	955775.0
	Digital Camera	842	684111.0	953027.0
USA	**Laptop**	658	439364.0	678399.0
	Digital Camera	503	428124.0	603703.0
Saudi Arabia	**VR Headset**	752	353659.0	482421.0
...	**...**	...	...	...
Morocco	**Headphones**	70	10697.0	13149.0
	Smart Speaker	104	8014.0	12195.0
France	**Fitness Tracker**	144	9240.0	11916.0
Morocco	**Gaming Console**	60	10393.0	11641.0
	Fitness Tracker	95	5045.0	8176.0

70 rows × 3 columns

In [54]:
```python
category_totals = agg_df.groupby(["Category"]).sum(numeric_only=True)
category_totals.sort_values(by="Total Price",ascending=False)
```

Out[54]:

Category	Quantity	Unit Price	Total Price
Laptop	3222	2025155.0	3091559.0
Digital Camera	2508	2073808.0	2911441.0
VR Headset	2709	1122681.0	1675333.0
Smartphone	2718	999473.0	1460660.0
Tablet	2810	728992.0	1042454.0
Smartwatch	2634	438410.0	645424.0
Gaming Console	2751	376134.0	552555.0
Headphones	2697	362531.0	528883.0
Smart Speaker	2531	252291.0	356713.0
Fitness Tracker	2620	172242.0	252816.0

In [55]:
```python
item_totals = agg_df.groupby(["Item"]).sum(numeric_only=True)
item_totals.sort_values(by="Total Price",ascending=False)
```

Out[55]:

	Quantity	Unit Price	Total Price
Item			
Canon EOS R5	133	295926.0	428088.0
Panasonic Lumix S1H	112	223936.0	306926.0
ASUS ROG Flow Z13	163	182427.0	283155.0
MacBook Pro 16"	135	155935.0	277033.0
XPS 15	191	137514.0	229532.0
...	...	...	...
Galaxy Tab A7	1	179.0	165.0
Amazon Fire HD 10	1	149.0	139.0
Sony WH-CH710N	1	129.0	129.0
Sennheiser HD 450BT	1	129.0	125.0
Amazon Fire 7	1	49.0	46.0

206 rows × 3 columns

In [56]:
```
country_sales = agg_df.groupby(["Country"]).agg({"Total Price":["sum"]})
country_sales.sort_values(by=("Total Price","sum"),ascending=False)
```

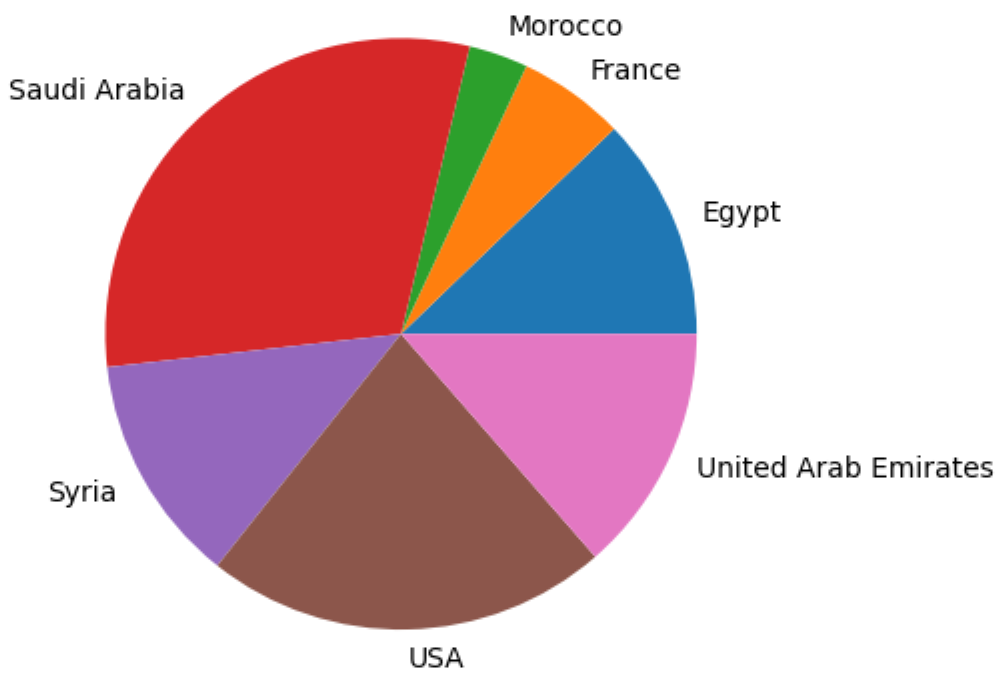
Out[56]:

	Total Price
	sum
Country	
Saudi Arabia	3821753.0
USA	2764045.0
United Arab Emirates	1701035.0
Syria	1569260.0
Egypt	1526289.0
France	730478.0
Morocco	404978.0

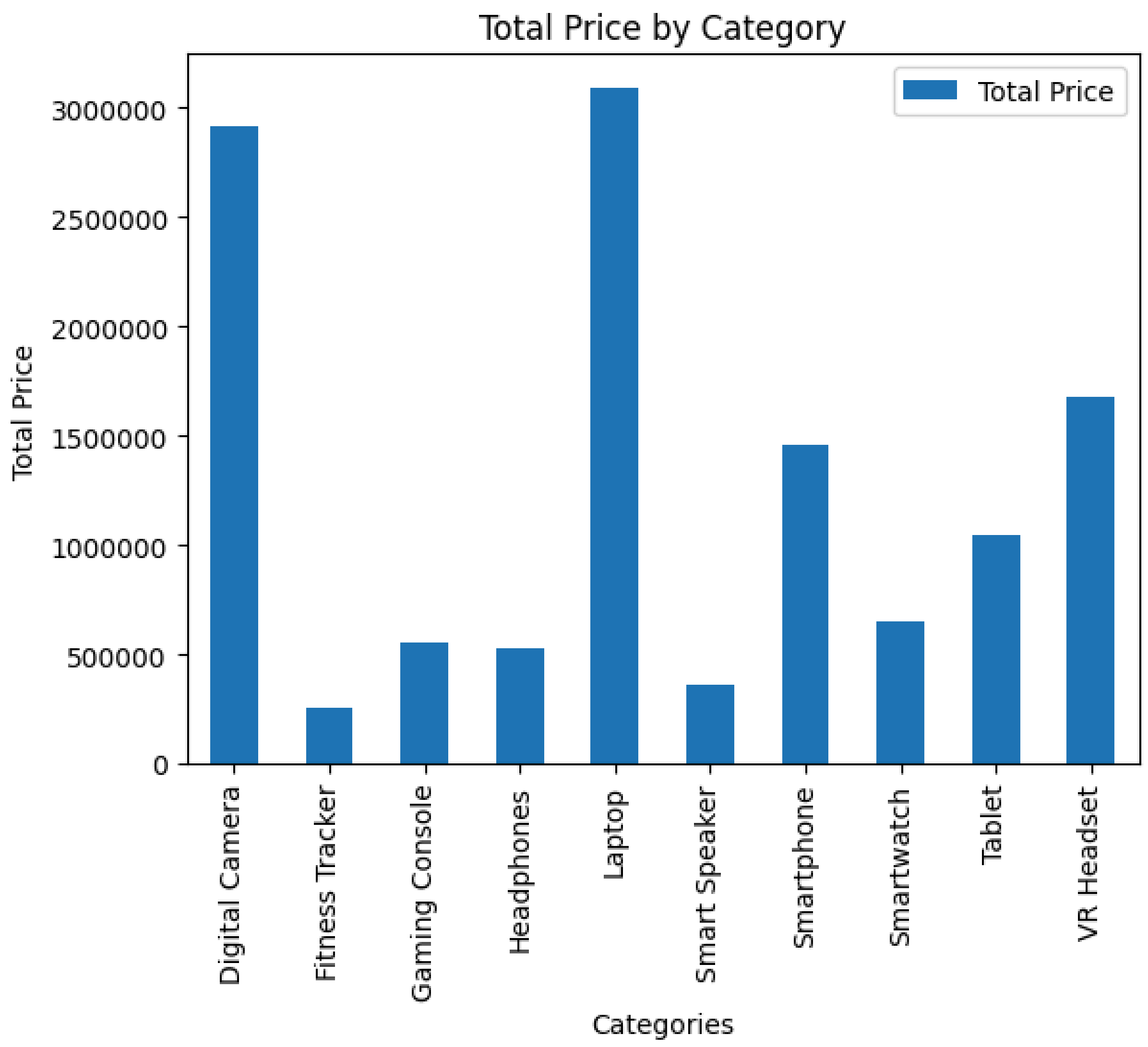
Visualize Data

In [57]:
```
country_sales.plot.pie(y="Total Price",legend=False, ylabel='')
```

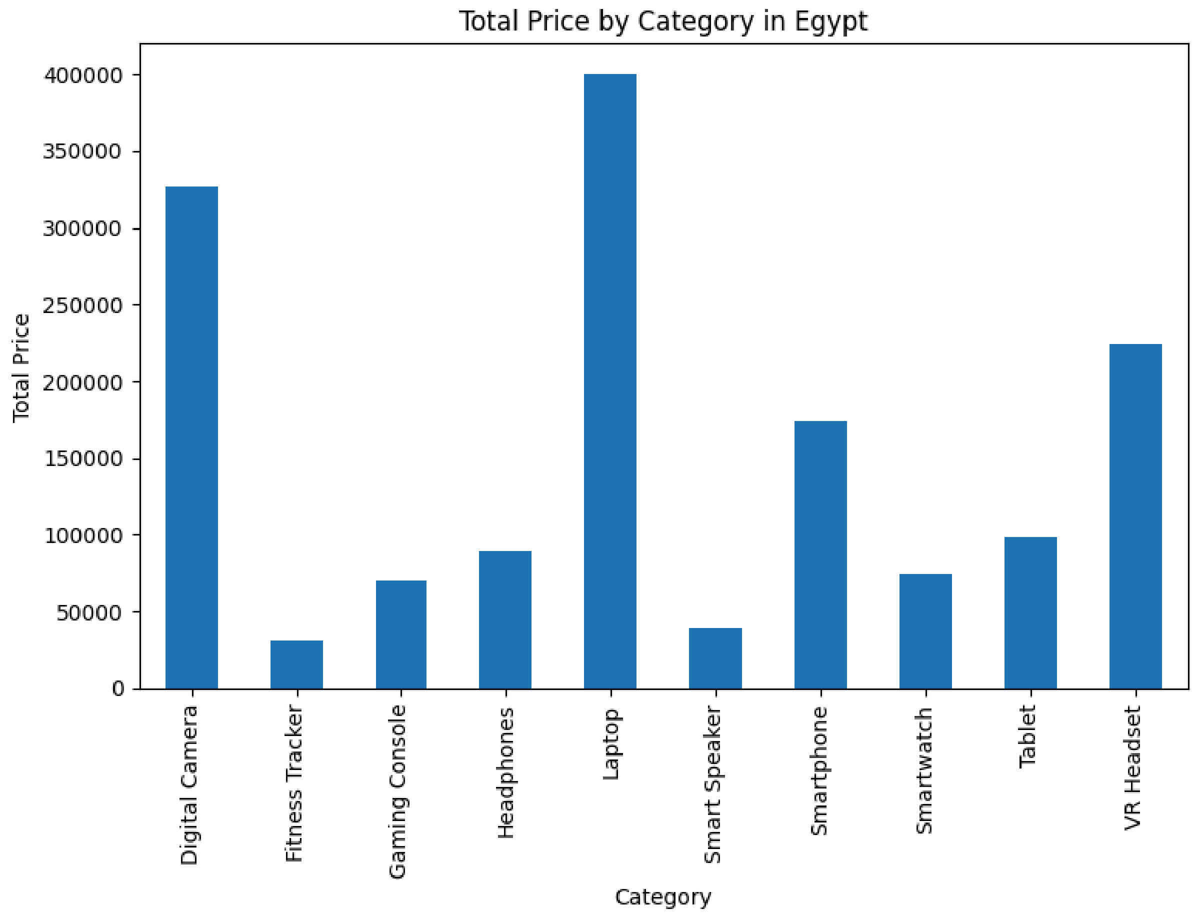
Out[57]:
```
<Axes: >
```

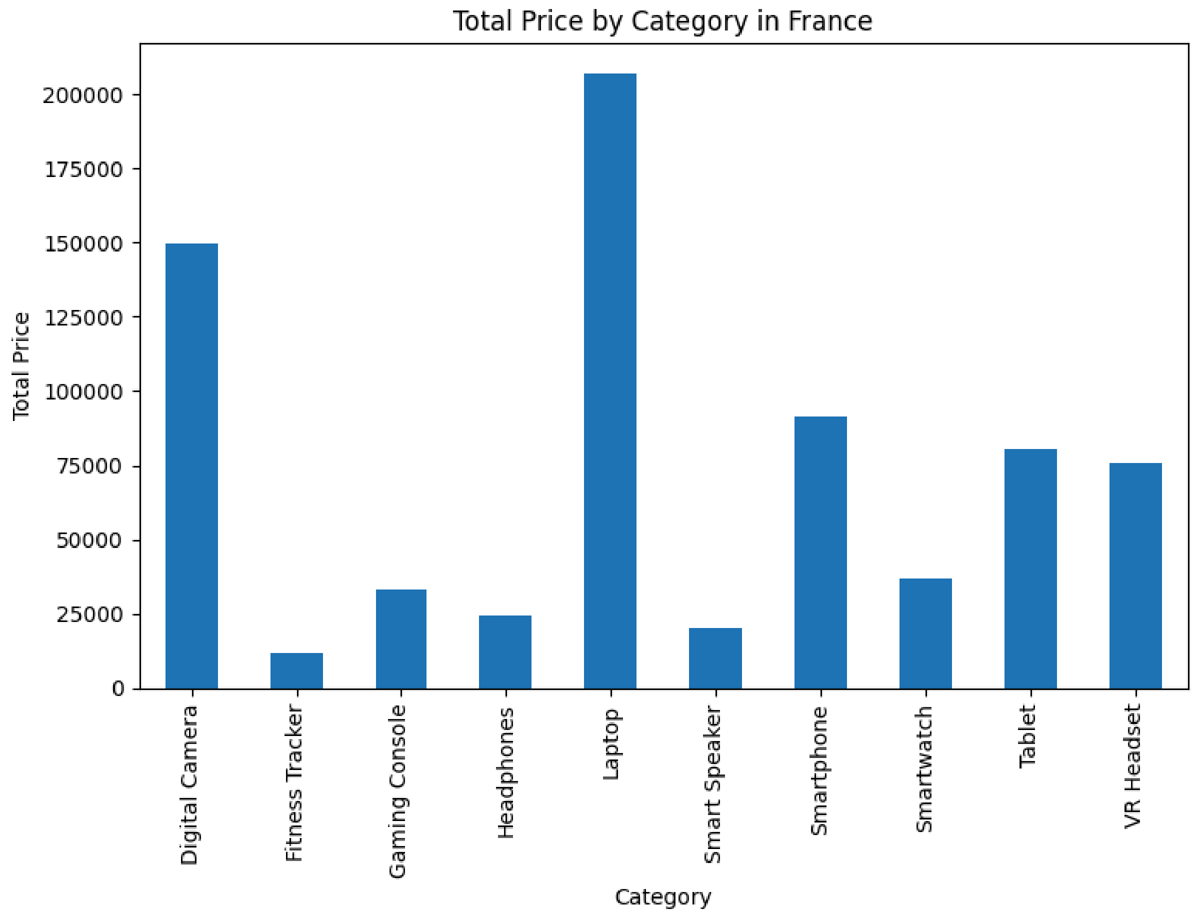


```
In [59]: category_totals.plot(kind="bar",y='Total Price')

         plt.ticklabel_format(style='plain', axis='y')

         plt.xlabel("Categories")
         plt.ylabel("Total Price")

         plt.title("Total Price by Category")
         plt.show()
```

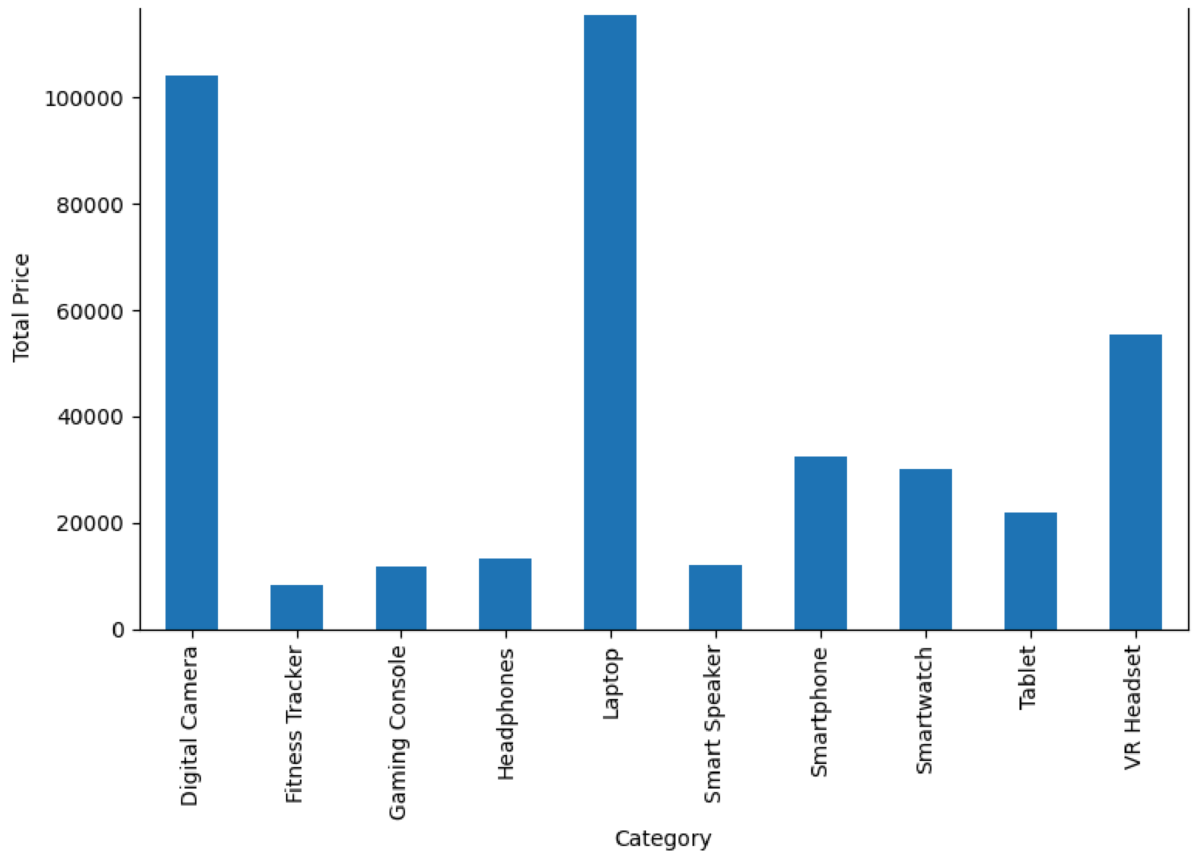


In [60]:
```python
# Group by 'Country' and 'Category', then sum 'Total Price'
country_category_sales = agg_df.groupby(["Country", "Category"]).sum(numeric_only=T

# Get the list of unique countries
countries = country_category_sales['Country'].unique()

# Create a subplot for each country
fig, axes = plt.subplots(nrows=len(countries), ncols=1, figsize=(8, 6 * len(countri

# If there's only one country, axes will not be an array, so we wrap it in a list
if len(countries) == 1:
    axes = [axes]

# Plot each country's data in its own subplot
for i, country in enumerate(countries):
    # Filter data for the current country
    country_data = country_category_sales[country_category_sales['Country'] == coun

    # Plot the bar chart for the current country
    ax = axes[i]
    country_data.plot(kind="bar", x='Category', y='Total Price', legend=False, ax=a
    # Disable scientific notation on the y-axis
    ax.ticklabel_format(style='plain', axis='y')

    # Add labels and title
    ax.set_xlabel("Category")
    ax.set_ylabel("Total Price")
    ax.set_title(f"Total Price by Category in {country}")

# Adjust layout to prevent overlap
plt.tight_layout()
plt.show()
```

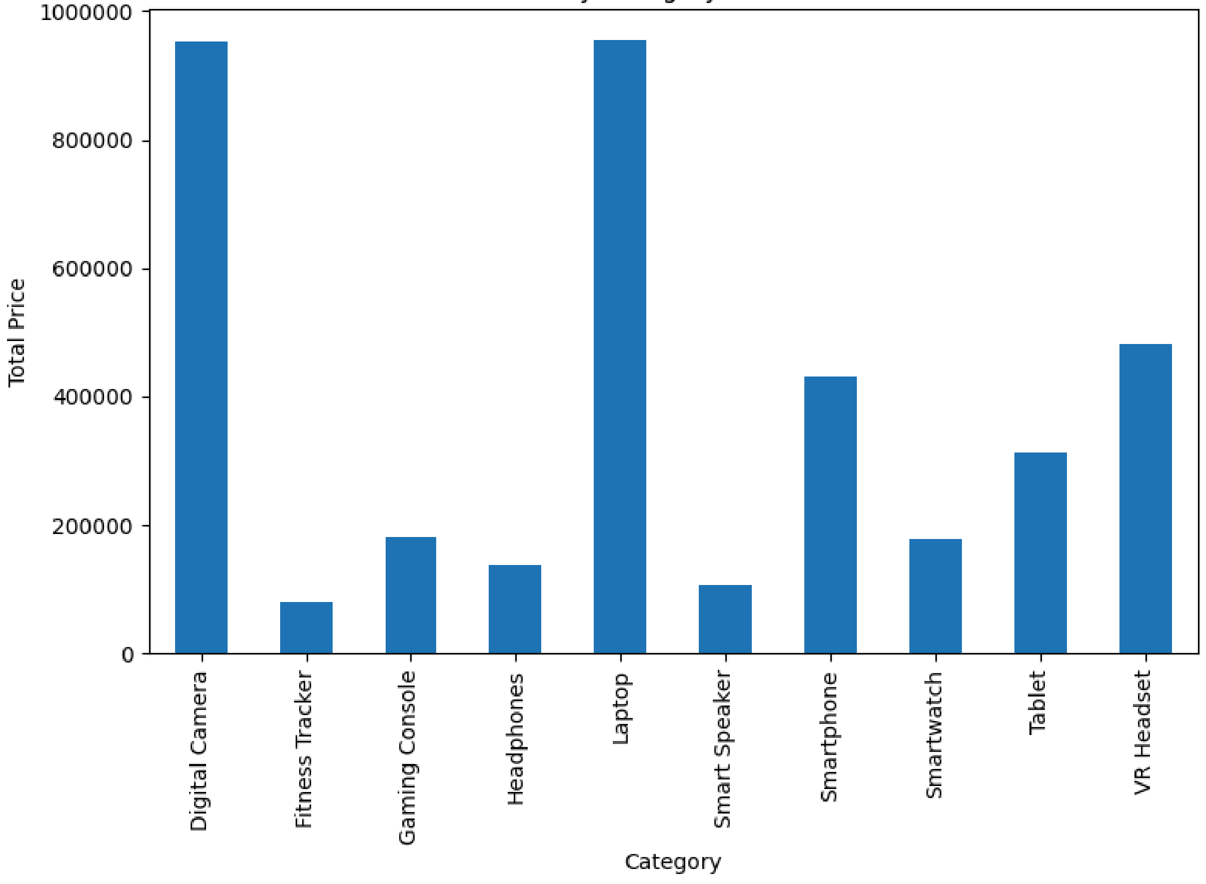

Total Price by Category in Egypt
Total Price
400000
350000
300000
250000
200000
150000
100000
50000
0
Digital Camera
Fitness Tracker
Gaming Console
Headphones
Laptop
Smart Speaker
Smartphone
Smartwatch
Tablet
VR Headset
Category


Total Price by Category in France
Total Price
200000
175000
150000
125000
100000
75000
50000
25000
0
Digital Camera
Fitness Tracker
Gaming Console
Headphones
Laptop
Smart Speaker
Smartphone
Smartwatch
Tablet
VR Headset
Category

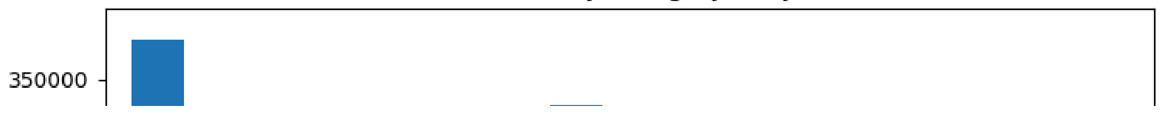
Total Price by Category in Morocco
120000

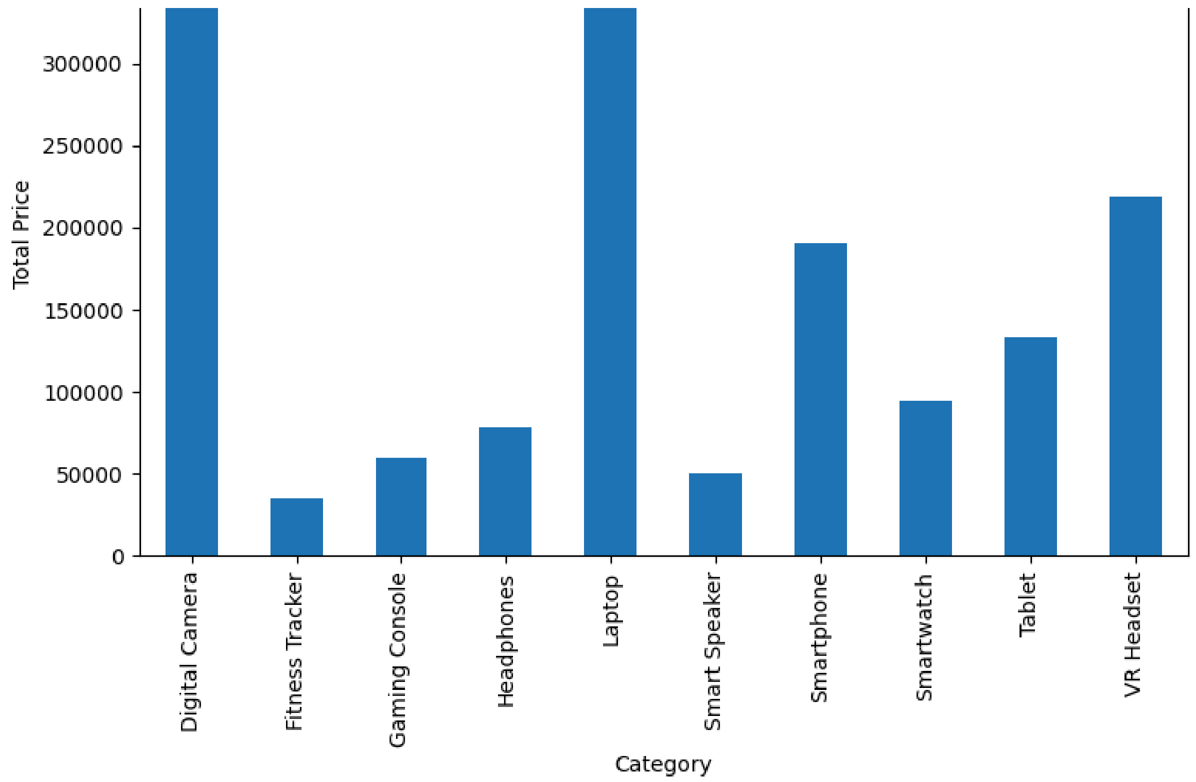


Total Price by Category in Saudi Arabia

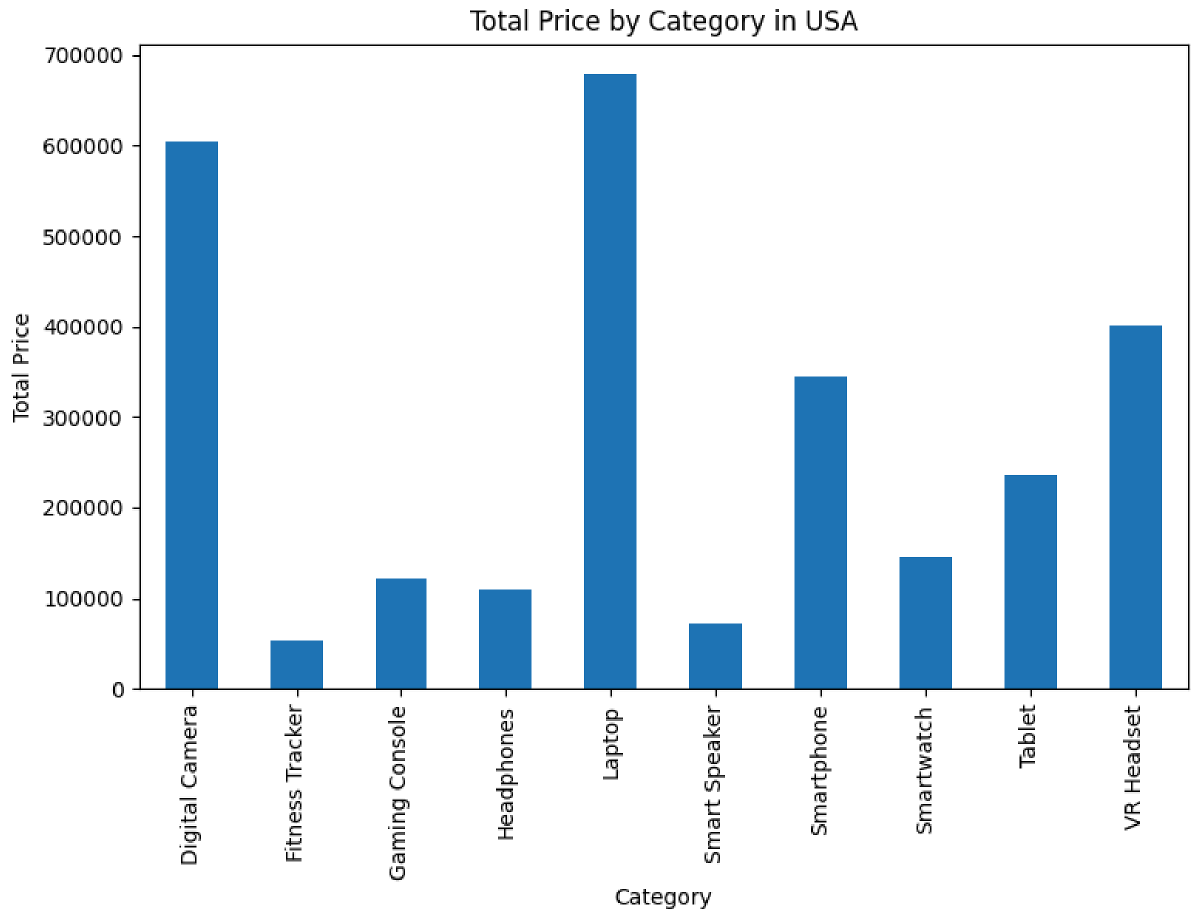


Total Price by Category in Syria

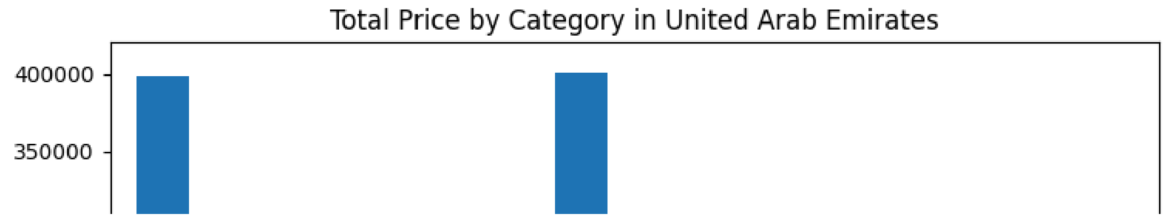




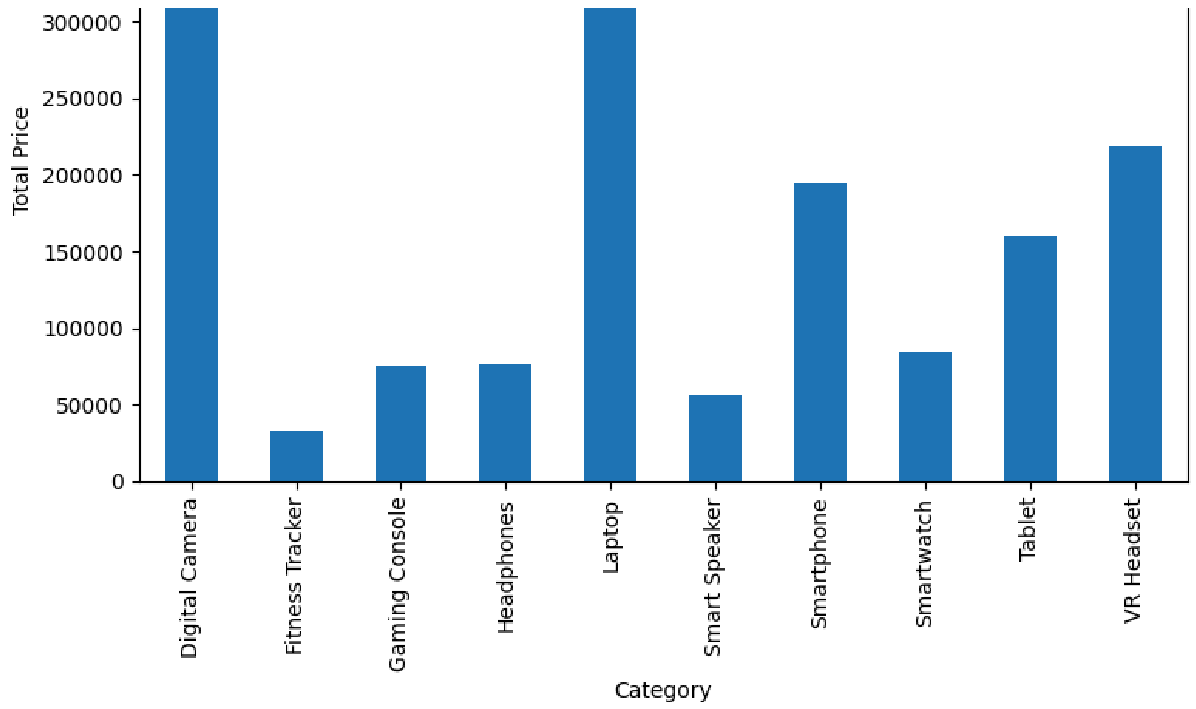
Total Price
Category
Digital Camera
Fitness Tracker
Gaming Console
Headphones
Laptop
Smart Speaker
Smartphone
Smartwatch
Tablet
VR Headset



Total Price by Category in USA
Total Price
Category
Digital Camera
Fitness Tracker
Gaming Console
Headphones
Laptop
Smart Speaker
Smartphone
Smartwatch
Tablet
VR Headset



Total Price by Category in United Arab Emirates



Total Price
300000
250000
200000
150000
100000
50000
0
Digital Camera
Fitness Tracker
Gaming Console
Headphones
Laptop
Smart Speaker
Smartphone
Smartwatch
Tablet
VR Headset
Category