In [1]:
```
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
import seaborn as sns
import warnings
warnings.filterwarnings("ignore")
```

In [2]:
```
df=pd.read_csv("Data/Amazon.csv")
```

In [3]:
```
df.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 100 entries, 0 to 99
Data columns (total 14 columns):
 #   Column          Non-Null Count  Dtype  
---  ------          --------------  -----  
 0   Region          100 non-null    object 
 1   Country         100 non-null    object 
 2   Item Type       100 non-null    object 
 3   Sales Channel   100 non-null    object 
 4   Order Priority  100 non-null    object 
 5   Order Date      100 non-null    object 
 6   Order ID        100 non-null    int64  
 7   Ship Date       100 non-null    object 
 8   Units Sold      100 non-null    int64  
 9   Unit Price      100 non-null    float64
 10  Unit Cost       100 non-null    float64
 11  Total Revenue   100 non-null    float64
 12  Total Cost      100 non-null    float64
 13  Total Profit    100 non-null    float64
dtypes: float64(5), int64(2), object(7)
memory usage: 11.1+ KB
```

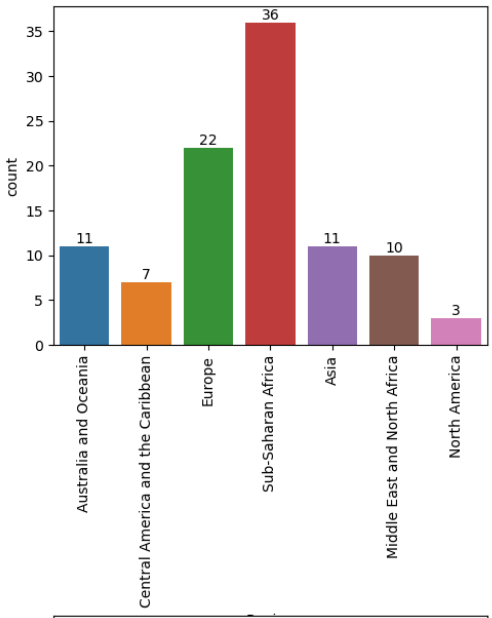
In [4]:
```
Rgn=df['Region'].value_counts().index
Rgn_values=df['Region'].value_counts().values
Rgn
```

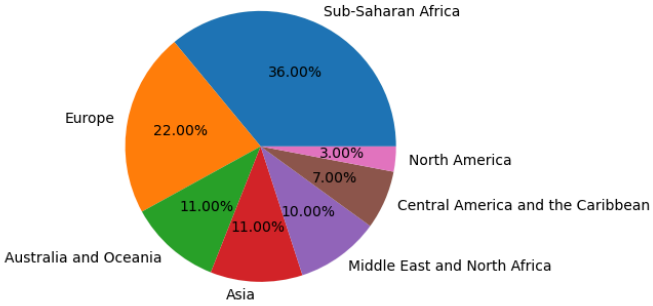
Out[4]:
```
Index(['Sub-Saharan Africa', 'Europe', 'Australia and Oceania', 'Asia',
       'Middle East and North Africa', 'Central America and the Caribbean',
       'North America'],
      dtype='object', name='Region')
```

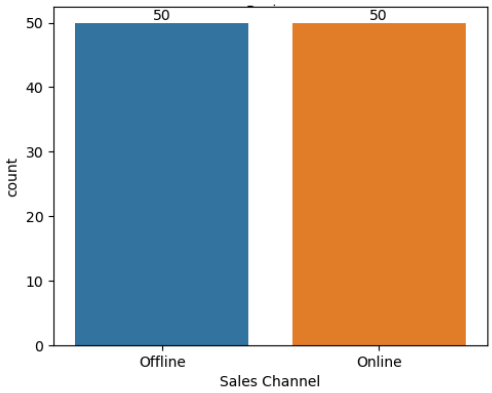
In [ ]:
```

```

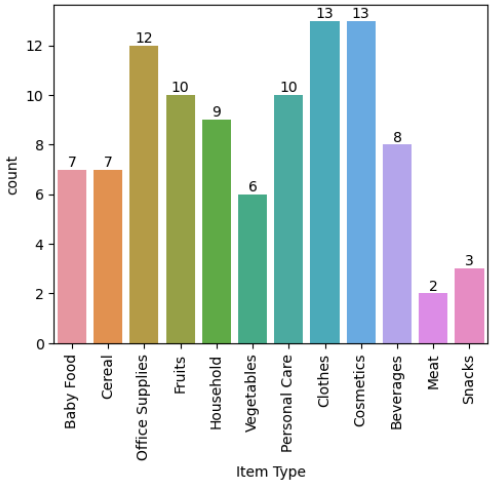
In [7]:
```
fig,((ax1,ax2),(ax3,ax4))=plt.subplots(2,2,figsize=(12,12))
sns.countplot(df,x="Region",ax=ax1)
ax1.tick_params(axis='x', rotation=90)
for container in ax1.containers:
    ax1.bar_label(container,color="black")

ax2.pie(x=Rgn_values,labels=Rgn,autopct="%1.2f%%")

sns.countplot(df,x="Sales Channel",ax=ax3)
for container in ax3.containers:
    ax3.bar_label(container,color="black")

sns.countplot(df,x="Item Type",ax=ax4)
ax4.tick_params(axis="x",rotation=90)
for container in ax4.containers:
    ax4.bar_label(container,color="black")
```

```
plt.subplots_adjust(hspace=0.8)
plt.show()
```









1).MOST OF THE SALES TOOK PLACE IN SUB-SAHARAN AFRICAN,EUROPEAN REGION NEARLY 36% AND 22% RESPECTIVELY.

2).MAJORITY OF THE ITEMS SOLD ARE OF THE TYPE CLOTHES,COSMETICS AND OFFICE SUPPLIES

3).THERE IS EQUAL NUMBER IN OFFLINE AS WELL AS ONLINE CHANNEL

In [ ]:

In [6]:
```
df.head()
```

Out[6]:

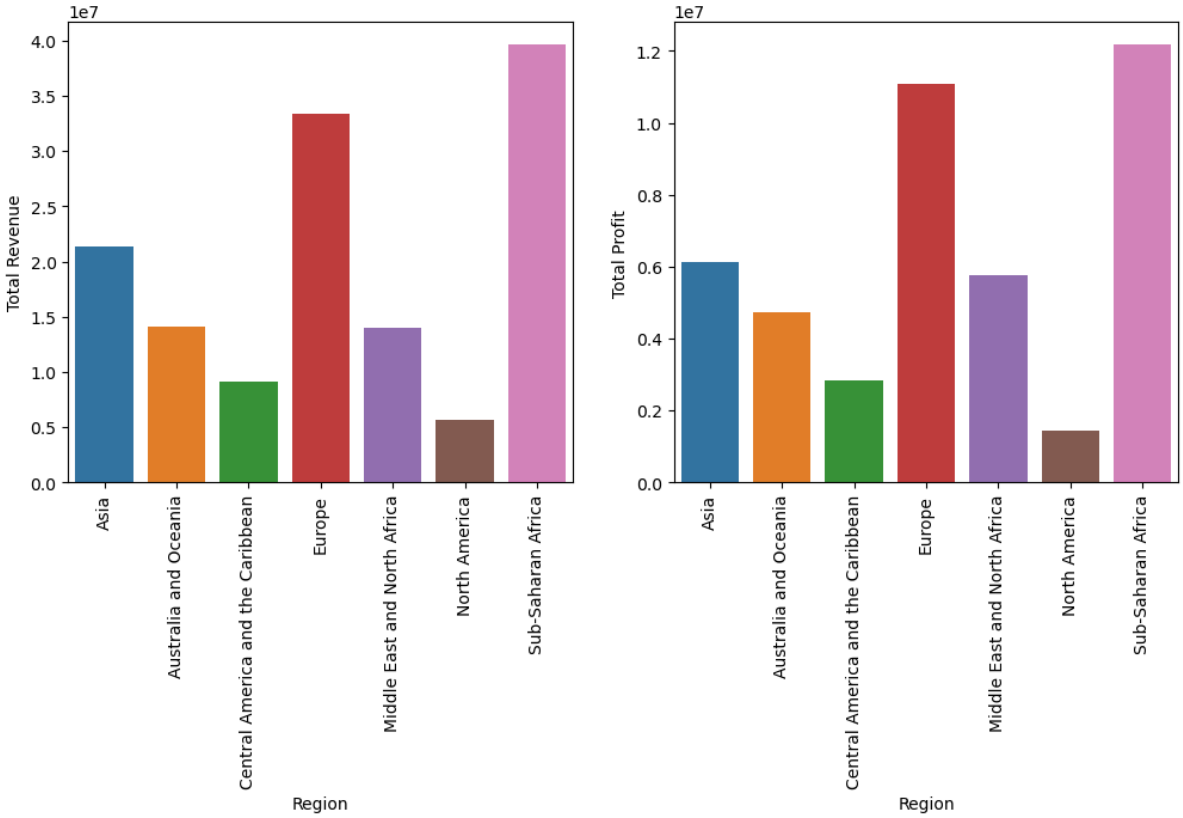
	Region	Country	Item Type	Sales Channel	Order Priority	Order Date	Order ID	Ship Date	Units Sold	Unit Price
0	Australia and Oceania	Tuvalu	Baby Food	Offline	H	5/28/2010	669165933	6/27/2010	9925	255.28
1	Central America and the Caribbean	Grenada	Cereal	Online	C	8/22/2012	963881480	9/15/2012	2804	205.70
2	Europe	Russia	Office Supplies	Offline	L	5/2/2014	341417157	5/8/2014	1779	651.21
3	Sub-Saharan Africa	Sao Tome and Principe	Fruits	Online	C	6/20/2014	514321792	7/5/2014	8102	9.33
4	Sub-Saharan Africa	Rwanda	Office Supplies	Offline	L	2/1/2013	115456712	2/6/2013	5062	651.21

In [8]:
```
revenue_by_region = df.groupby('Region').agg({"Total Revenue":"sum",
                                               "Total Profit":"sum"}).reset_index()
revenue_by_region
```

Out[8]:

	Region	Total Revenue	Total Profit
0	Asia	21347091.02	6113845.87
1	Australia and Oceania	14094265.13	4722160.03
2	Central America and the Caribbean	9170385.49	2846907.85
3	Europe	33368932.11	11082938.63
4	Middle East and North Africa	14052706.58	5761191.86
5	North America	5643356.55	1457942.76
6	Sub-Saharan Africa	39672031.43	12183211.40

In [9]:
```
fig,(ax1,ax2)=plt.subplots(1,2,figsize=(12,5))
sns.barplot(revenue_by_region,x="Region",y="Total Revenue",ax=ax1)
ax1.tick_params(axis="x",rotation=90)
sns.barplot(revenue_by_region,x="Region",y="Total Profit",ax=ax2)
ax2.tick_params(axis="x",rotation=90)
```



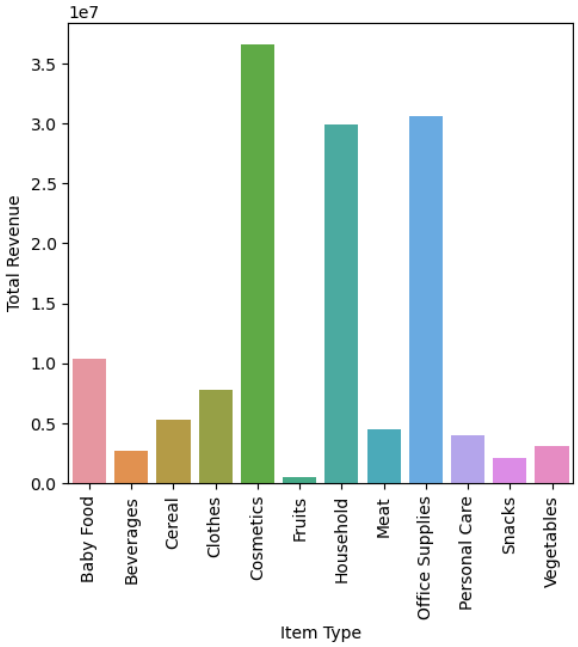
1.) MOST REVENUE AND PROFIT IS GENERATED FROM THE SUB-SAHARAN AFRICAN REGION.

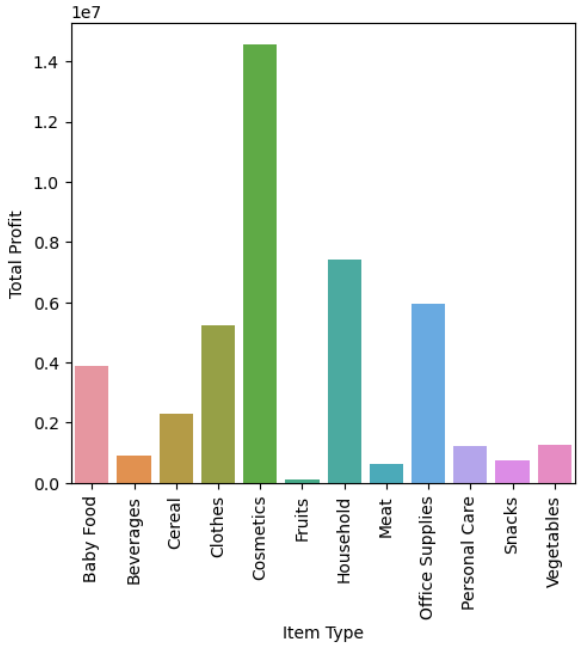
In [10]:
```
revenue_by_item=df.groupby("Item Type").agg({"Total Revenue":"sum","Total Profit":'
revenue_by_item
```

Out[10]:

	Item Type	Total Revenue	Total Profit
0	Baby Food	10350327.60	3886643.70
1	Beverages	2690794.60	888047.28
2	Cereal	5322898.90	2292443.43
3	Clothes	7787292.80	5233334.40
4	Cosmetics	36601509.60	14556048.66
5	Fruits	466481.34	120495.18
6	Household	29889712.29	7412605.71
7	Meat	4503675.75	610610.00
8	Office Supplies	30585380.07	5929583.75
9	Personal Care	3980904.84	1220622.48
10	Snacks	2080733.46	751944.18
11	Vegetables	3089057.06	1265819.63

In [11]:
```
fig,(ax1,ax2)=plt.subplots(1,2,figsize=(12,5))
sns.barplot(revenue_by_item,x="Item Type",y="Total Revenue",ax=ax1)
ax1.tick_params(axis="x",rotation=90)
sns.barplot(revenue_by_item,x="Item Type",y="Total Profit",ax=ax2)
ax2.tick_params(axis="x",rotation=90)
```





MOST OF THE REVENUE AND PROFIT IS GENERATED ON THE ITEMS OF COSMETICS,HOUSEHOLD,OFFICE SUPPLIES.

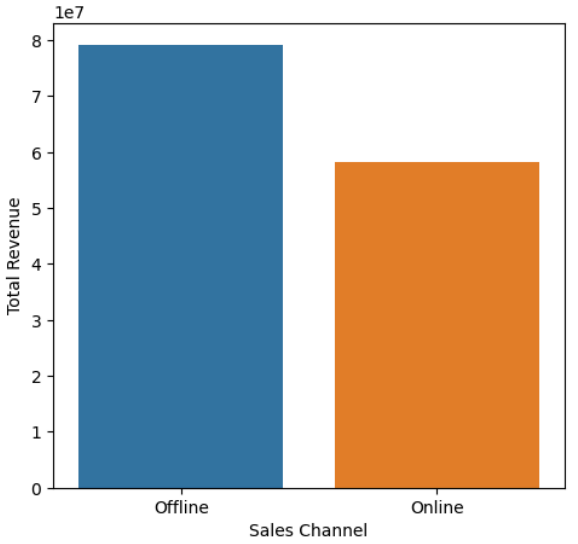
In [12]:
```
revenue_by_sales_channel=df.groupby("Sales Channel").agg({"Total Revenue":"sum","To
revenue_by_sales_channel
```

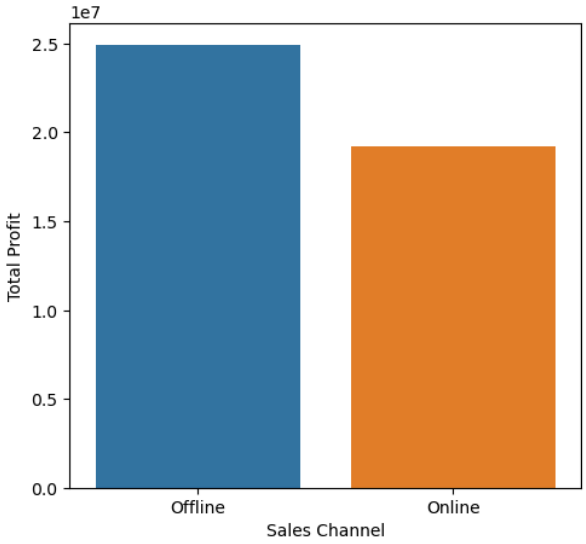
Out[12]:

	Sales Channel	Total Revenue	Total Profit
0	Offline	79094809.20	24920726.67
1	Online	58253959.11	19247471.73

In [13]:
```
fig,(ax1,ax2)=plt.subplots(1,2,figsize=(12,5))
sns.barplot(revenue_by_sales_channel,x="Sales Channel",y="Total Revenue",ax=ax1)
sns.barplot(revenue_by_sales_channel,x="Sales Channel",y="Total Profit",ax=ax2)
```

Out[13]:
```
<Axes: xlabel='Sales Channel', ylabel='Total Profit'>
```



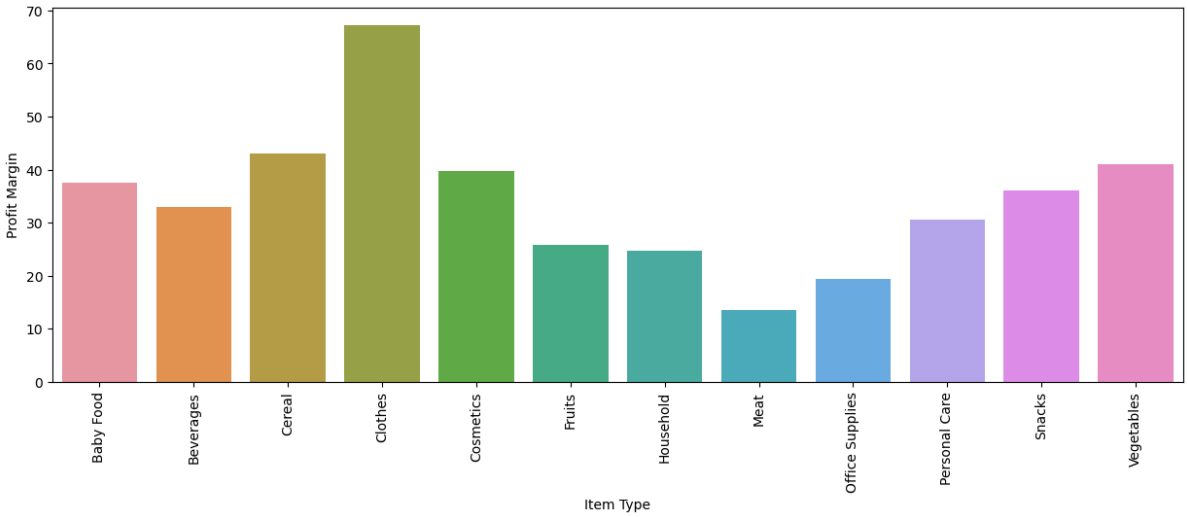


MOST OF THE REVENUE AND PROFIT IS GENERATED FROM OFFLINE SALES CHANNEL AS COMPARED TO ONLINE

In [14]:
```
df["Profit Margin"]=(df["Total Profit"]/df["Total Revenue"])*100
```

In [15]:
```
profit_margin_by_item=df.groupby("Item Type").agg({"Profit Margin":"mean"
}).reset_index()
```

In [16]:
```
plt.figure(figsize=(15, 5))
sns.barplot(profit_margin_by_item,x="Item Type",y="Profit Margin")
plt.tick_params(axis="x",rotation=90)
```



MOST PROFIT MARGIN IS EARNED BY THE SALE OF CLOTHES AND THE PROFIT MARGIN IS OF MEAT.

In [17]:
```
df[df["Item Type"]=="Baby Food"][["Sales Channel","Units Sold"]]
```

Out[17]:

	Sales Channel	Units Sold
0	Offline	9925
5	Online	2974
20	Online	7450
21	Online	1273
61	Online	4750
78	Offline	8614
87	Offline	5559

In [18]:
```
customer_behavior = df.groupby('Item Type').agg({
    "Order ID": "count",
    "Total Revenue": "sum",
    "Units Sold": "sum"
}).reset_index()
```

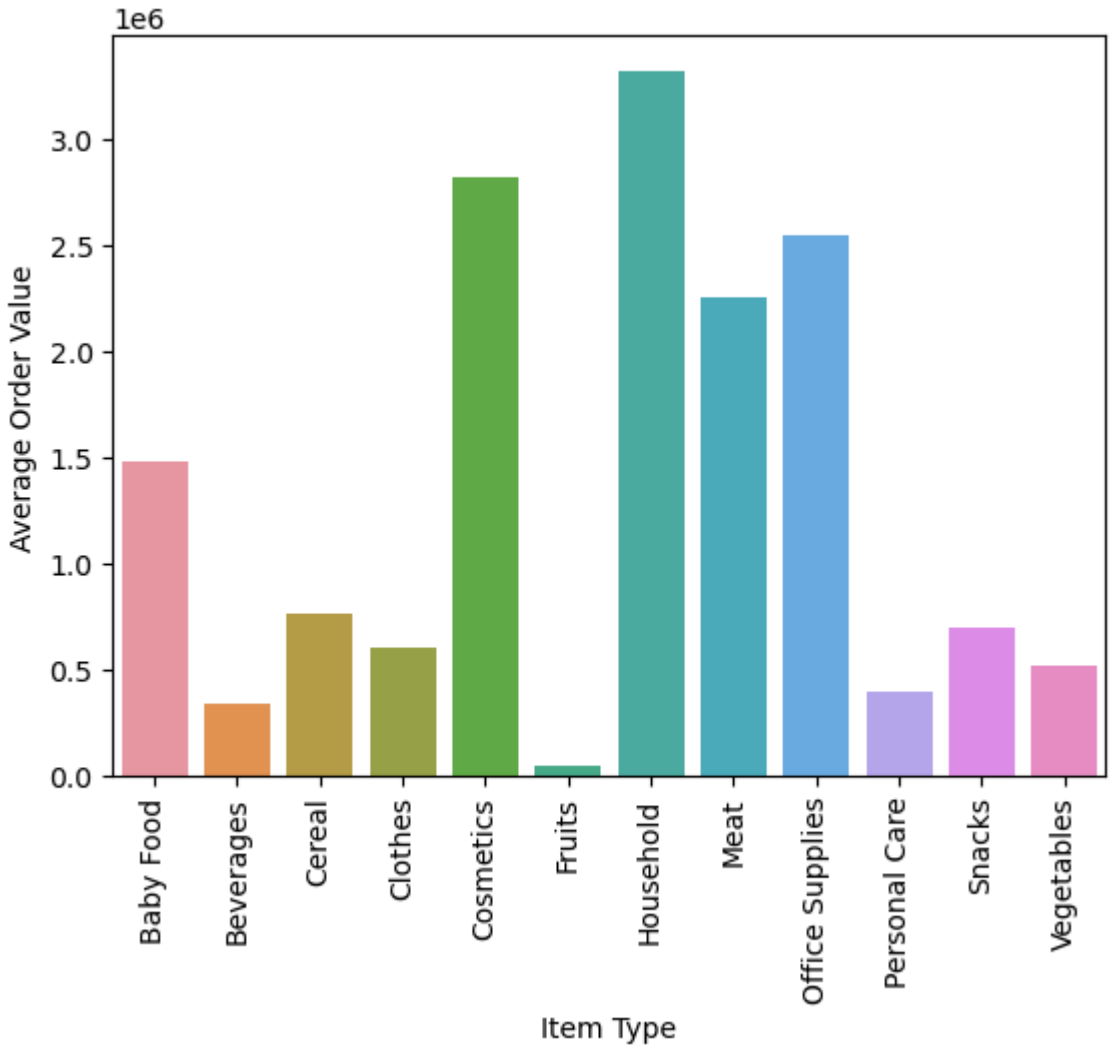
In [19]:
```
customer_behavior["Average Order Value"]=customer_behavior["Total Revenue"]/custome
```

In [20]:
```
customer_behavior
```

Out[20]:

	Item Type	Order ID	Total Revenue	Units Sold	Average Order Value
0	Baby Food	7	10350327.60	40545	1.478618e+06
1	Beverages	8	2690794.60	56708	3.363493e+05
2	Cereal	7	5322898.90	25877	7.604141e+05
3	Clothes	13	7787292.80	71260	5.990225e+05
4	Cosmetics	13	36601509.60	83718	2.815501e+06
5	Fruits	10	466481.34	49998	4.664813e+04
6	Household	9	29889712.29	44727	3.321079e+06
7	Meat	2	4503675.75	10675	2.251838e+06
8	Office Supplies	12	30585380.07	46967	2.548782e+06
9	Personal Care	10	3980904.84	48708	3.980905e+05
10	Snacks	3	2080733.46	13637	6.935778e+05
11	Vegetables	6	3089057.06	20051	5.148428e+05

In [21]:
```
sns.barplot(customer_behavior,x="Item Type",y="Average Order Value")
plt.tick_params(axis="x",rotation=90)
```



The Average Order Value (AOV) is highest for household items, followed by cosmetics, office supplies, and meat. Therefore, we should stock up on these items more.

In [25]:
```
df.head()
```

Out[25]:

	Region	Country	Item Type	Sales Channel	Order Priority	Order Date	Order ID	Ship Date	Units Sold	Unit Price	Unit Cost
0	Australia and Oceania	Tuvalu	Baby Food	Offline	H	2010-05-28	669165933	2010-06-27	9925	255.28	159.42
1	Central America and the Caribbean	Grenada	Cereal	Online	C	2012-08-22	963881480	2012-09-15	2804	205.70	117.11
2	Europe	Russia	Office Supplies	Offline	L	2014-05-02	341417157	2014-05-08	1779	651.21	524.96
3	Sub-Saharan Africa	Sao Tome and Principe	Fruits	Online	C	2014-06-20	514321792	2014-07-05	8102	9.33	6.92
4	Sub-Saharan Africa	Rwanda	Office Supplies	Offline	L	2013-02-01	115456712	2013-02-06	5062	651.21	524.96

In [ ]:
```
```

In [22]:
```
import datetime
df['Order Date'] = pd.to_datetime(df['Order Date'])
df['Ship Date'] = pd.to_datetime(df['Ship Date'])
```

In [23]:
```
df["Order Month"]=df["Order Date"].dt.month
```

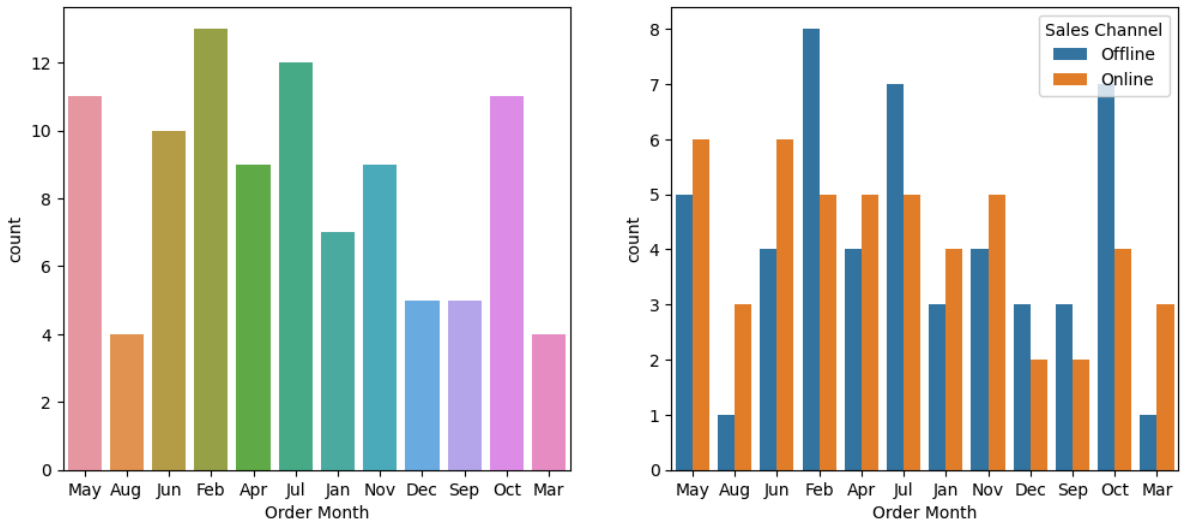
In [24]:
```
df["Order Month"]=df["Order Month"].map({1: "Jan", 2: "Feb", 3: "Mar", 4: "Apr", 5:
    7: "Jul", 8: "Aug", 9: "Sep", 10: "Oct", 11: "Nov", 12: "Dec"})
```

In [26]:
```
month_counts=df.groupby("Order Month").agg({"Order ID":"count"})
month_counts
```

Out[26]:

Order Month	Order ID
Apr	9
Aug	4
Dec	5
Feb	13
Jan	7
Jul	12
Jun	10
Mar	4
May	11
Nov	9
Oct	11
Sep	5

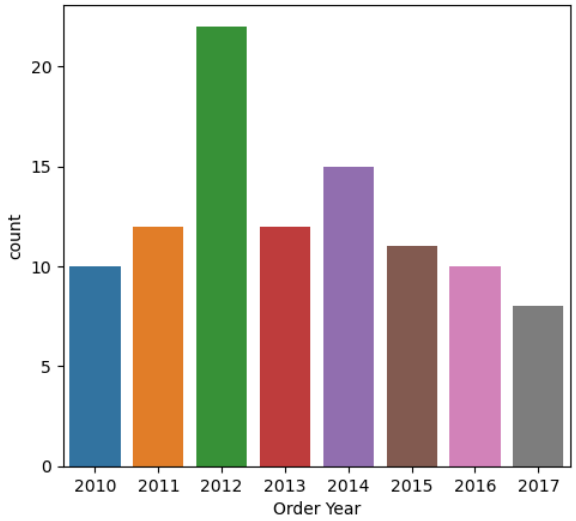
In [27]:
```
fig,(ax1,ax2)=plt.subplots(1,2,figsize=(12,5))
sns.countplot(df,x="Order Month",ax=ax1)
sns.countplot(df,x="Order Month",hue="Sales Channel",ax=ax2)
plt.show()
```

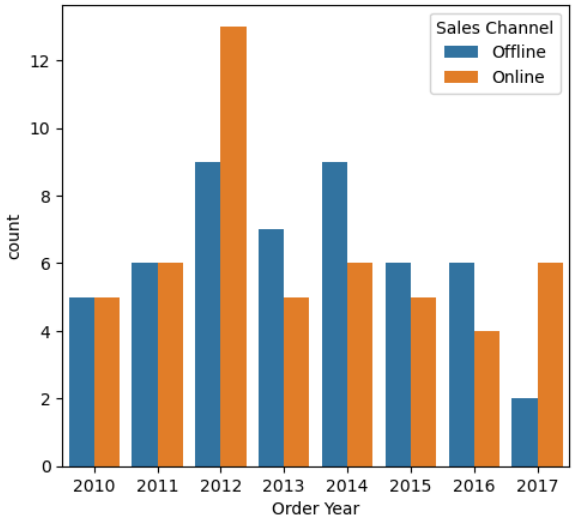


In [ ]:
```
```

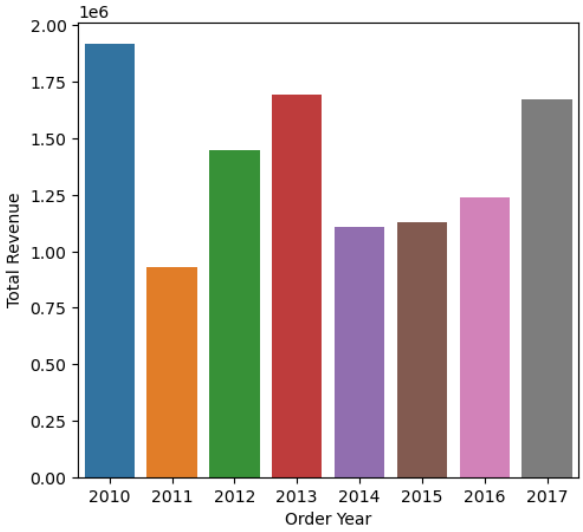
In [28]:
```
df["Order Year"]=df["Order Date"].dt.year
```

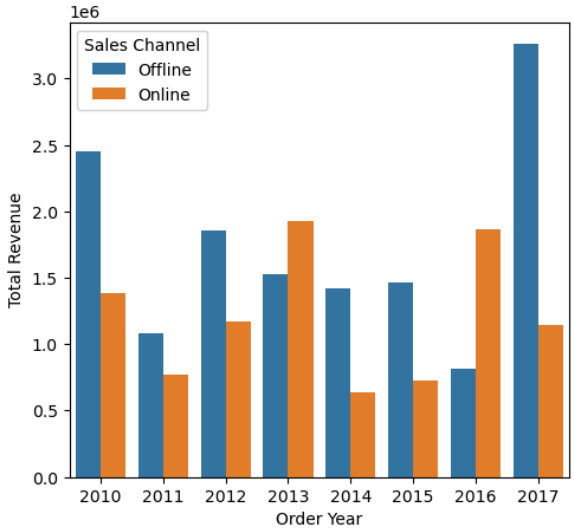
In [29]:
```
fig,(ax1,ax2)=plt.subplots(1,2,figsize=(12,5))
sns.countplot(df,x="Order Year",ax=ax1)
sns.countplot(df,x="Order Year",hue="Sales Channel",ax=ax2)
plt.show()
```



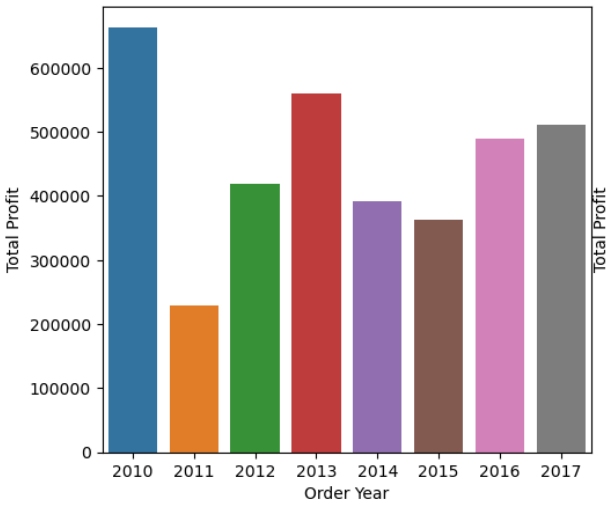


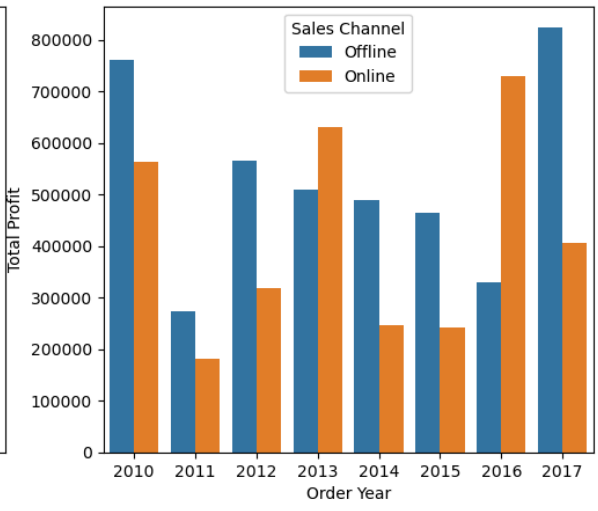
In [30]:
```
fig,(ax1,ax2)=plt.subplots(1,2,figsize=(12,5))
sns.barplot(df,x="Order Year",y="Total Revenue",ci=None,ax=ax1)
sns.barplot(df,x="Order Year",y="Total Revenue",hue="Sales Channel",ci=None,ax=ax2)
plt.show()
```





In [31]:
```
fig,(ax1,ax2)=plt.subplots(1,2,figsize=(12,5))
sns.barplot(df,x="Order Year",y="Total Profit",ci=None,ax=ax1)
sns.barplot(df,x="Order Year",y="Total Profit",hue="Sales Channel",ci=None,ax=ax2)
plt.show()
```





In [32]:
```
df.head()
```

Out[32]:

	Region	Country	Item Type	Sales Channel	Order Priority	Order Date	Order ID	Ship Date	Units Sold	Unit Price	Unit Cost
0	Australia and Oceania	Tuvalu	Baby Food	Offline	H	2010-05-28	669165933	2010-06-27	9925	255.28	159.42
1	Central America and the Caribbean	Grenada	Cereal	Online	C	2012-08-22	963881480	2012-09-15	2804	205.70	117.11
2	Europe	Russia	Office Supplies	Offline	L	2014-05-02	341417157	2014-05-08	1779	651.21	524.96
3	Sub-Saharan Africa	Sao Tome and Principe	Fruits	Online	C	2014-06-20	514321792	2014-07-05	8102	9.33	6.92
4	Sub-Saharan Africa	Rwanda	Office Supplies	Offline	L	2013-02-01	115456712	2013-02-06	5062	651.21	524.96

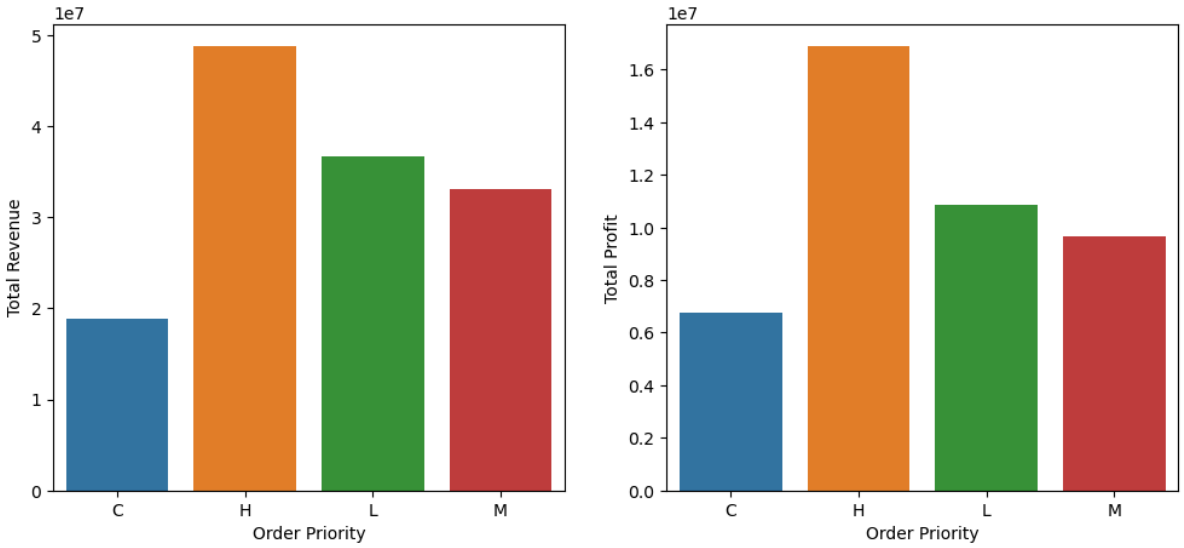
In [33]:
```
priority = df.groupby("Order Priority").agg({"Total Revenue":"sum","Total Profit":'
priority
```

Out[33]:

	Order Priority	Total Revenue	Total Profit
0	C	18855063.05	6748328.46
1	H	48749546.05	16891599.58
2	L	36628127.46	10858727.86
3	M	33116031.75	9669542.50

In [34]:
```
fig,(ax1,ax2)=plt.subplots(1,2,figsize=(12,5))
sns.barplot(priority,x="Order Priority",y="Total Revenue",ax=ax1)
sns.barplot(priority,x="Order Priority",y="Total Profit",ax=ax2)
```

Out[34]:
```
<Axes: xlabel='Order Priority', ylabel='Total Profit'>
```



In [35]:
```
priority_counts = df.groupby(['Region', 'Order Priority']).size().unstack(fill_valu
```

```
priority_percentage = priority_counts.div(priority_counts.sum(axis=1), axis=0) * 10
priority_percentage
```

Out[35]:

Order Priority	C	H	L	M
Region				
Asia	18.181818	27.272727	36.363636	18.181818
Australia and Oceania	36.363636	45.454545	9.090909	9.090909
Central America and the Caribbean	28.571429	28.571429	28.571429	14.285714
Europe	22.727273	31.818182	27.272727	18.181818
Middle East and North Africa	0.000000	20.000000	40.000000	40.000000
North America	33.333333	0.000000	33.333333	33.333333
Sub-Saharan Africa	22.222222	30.555556	25.000000	22.222222

In [36]:

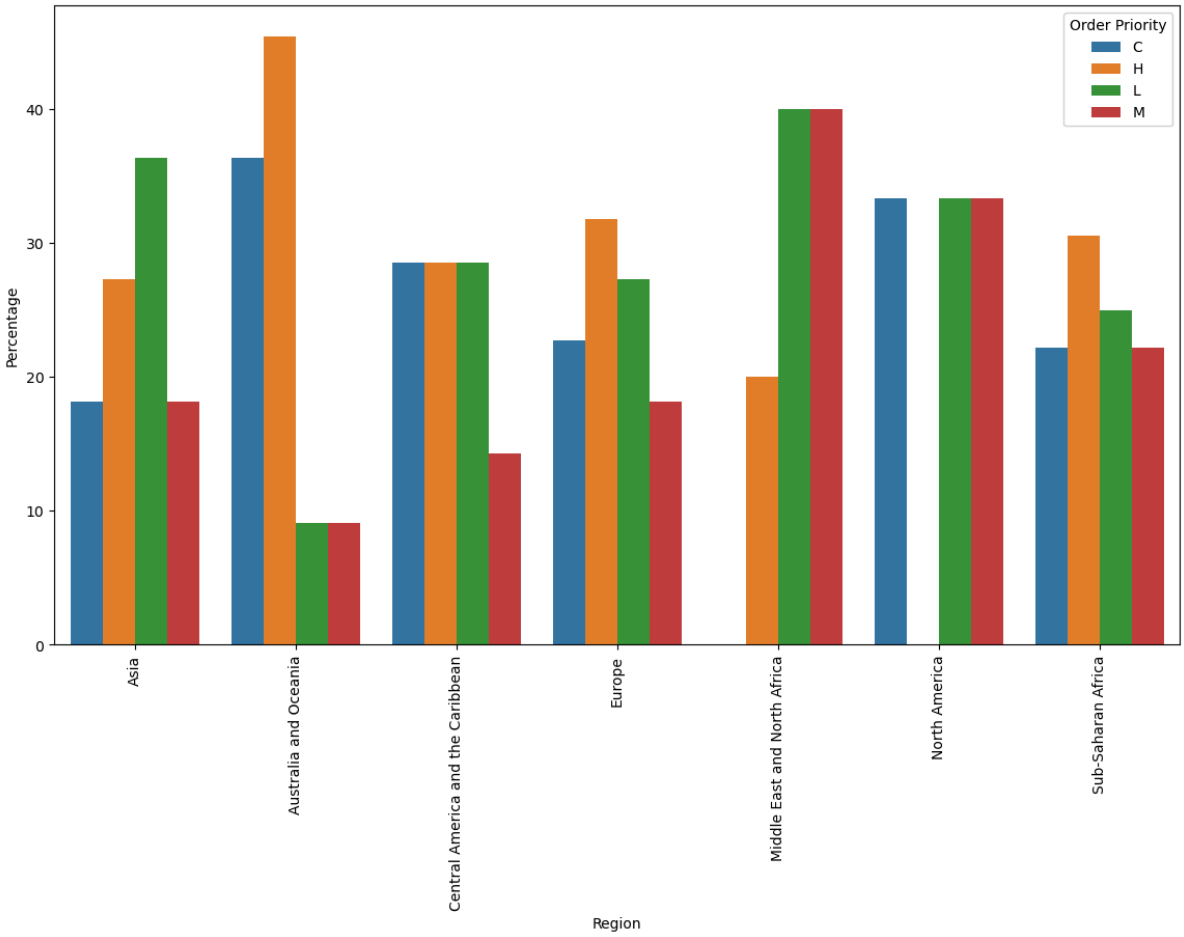
```
priority_percentage = priority_percentage.reset_index()

priority_percentage_melted = priority_percentage.melt(id_vars='Region', var_name='C

priority_percentage_melted
```

Out[36]:

	Region	Order Priority	Percentage
0	Asia	C	18.181818
1	Australia and Oceania	C	36.363636
2	Central America and the Caribbean	C	28.571429
3	Europe	C	22.727273
4	Middle East and North Africa	C	0.000000
5	North America	C	33.333333
6	Sub-Saharan Africa	C	22.222222
7	Asia	H	27.272727
8	Australia and Oceania	H	45.454545
9	Central America and the Caribbean	H	28.571429
10	Europe	H	31.818182
11	Middle East and North Africa	H	20.000000
12	North America	H	0.000000
13	Sub-Saharan Africa	H	30.555556
14	Asia	L	36.363636
15	Australia and Oceania	L	9.090909
16	Central America and the Caribbean	L	28.571429
17	Europe	L	27.272727
18	Middle East and North Africa	L	40.000000
19	North America	L	33.333333
20	Sub-Saharan Africa	L	25.000000
21	Asia	M	18.181818
22	Australia and Oceania	M	9.090909
23	Central America and the Caribbean	M	14.285714
24	Europe	M	18.181818
25	Middle East and North Africa	M	40.000000
26	North America	M	33.333333
27	Sub-Saharan Africa	M	22.222222

In [37]:

```
plt.figure(figsize=(14,8))
sns.barplot(data=priority_percentage_melted, x='Region', y='Percentage', hue='Order
plt.xticks(rotation=90)
plt.show()
```



In [38]:
```
df.to_csv("Updated.csv")
```

In [ ]:
```

```