In [1]:
```
import numpy as np
import pandas as pd
import matplotlib.pyplot as plt
%matplotlib inline
import plotly.express as px
import seaborn as sns
```

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

data = df.copy()
data.head()
```

Out[2]:

	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	15
1	Central America and the Caribbean	Grenada	Cereal	Online	C	8/22/2012	963881480	9/15/2012	2804	205.70	11
2	Europe	Russia	Office Supplies	Offline	L	5/2/2014	341417157	5/8/2014	1779	651.21	52
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	52

In [3]:
```
data = data[["Order ID","Order Date","Order Priority","Ship Date","Item Type","Region"

data.head()
```

Out[3]:

	Order ID	Order Date	Order Priority	Ship Date	Item Type	Region	Country	Sales Channel	Units Sold	Unit Price	
0	669165933	5/28/2010	H	6/27/2010	Baby Food	Australia and Oceania	Tuvalu	Offline	9925	255.28	15
1	963881480	8/22/2012	C	9/15/2012	Cereal	Central America and the Caribbean	Grenada	Online	2804	205.70	11
2	341417157	5/2/2014	L	5/8/2014	Office Supplies	Europe	Russia	Offline	1779	651.21	52
3	514321792	6/20/2014	C	7/5/2014	Fruits	Sub-Saharan Africa	Sao Tome and Principe	Online	8102	9.33	
4	115456712	2/1/2013	L	2/6/2013	Office Supplies	Sub-Saharan Africa	Rwanda	Offline	5062	651.21	52

In [4]:
```python
data.axes[1]
```

Out[4]:
```
Index(['Order ID', 'Order Date', 'Order Priority', 'Ship Date', 'Item Type',
       'Region', 'Country', 'Sales Channel', 'Units Sold', 'Unit Price',
       'Unit Cost', 'Total Revenue', 'Total Cost', 'Total Profit'],
      dtype='object')
```

In [5]:
```python
data.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 100 entries, 0 to 99
Data columns (total 14 columns):
 #   Column          Non-Null Count  Dtype  
---  ------          --------------  -----  
 0   Order ID        100 non-null    int64  
 1   Order Date      100 non-null    object 
 2   Order Priority  100 non-null    object 
 3   Ship Date       100 non-null    object 
 4   Item Type       100 non-null    object 
 5   Region          100 non-null    object 
 6   Country         100 non-null    object 
 7   Sales Channel   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
```

Checking for Missing Data

In [6]:
```python
data.isnull().sum()
```

Out[6]:
```
Order ID          0
Order Date        0
Order Priority    0
Ship Date         0
Item Type         0
Region            0
Country           0
Sales Channel     0
Units Sold        0
Unit Price        0
Unit Cost         0
Total Revenue     0
Total Cost        0
Total Profit      0
dtype: int64
```

In [7]:
```
data.describe()
```

Out[7]:

	Order ID	Units Sold	Unit Price	Unit Cost	Total Revenue	Total Cost	Total Profit
count	1.000000e+02	100.000000	100.000000	100.000000	1.000000e+02	1.000000e+02	1.000000e+02
mean	5.550204e+08	5128.710000	276.761300	191.048000	1.373488e+06	9.318057e+05	4.416820e+05
std	2.606153e+08	2794.484562	235.592241	188.208181	1.460029e+06	1.083938e+06	4.385379e+05
min	1.146066e+08	124.000000	9.330000	6.920000	4.870260e+03	3.612240e+03	1.258020e+03
25%	3.389225e+08	2836.250000	81.730000	35.840000	2.687212e+05	1.688680e+05	1.214436e+05
50%	5.577086e+08	5382.500000	179.880000	107.275000	7.523144e+05	3.635664e+05	2.907680e+05
75%	7.907551e+08	7369.000000	437.200000	263.330000	2.212045e+06	1.613870e+06	6.358288e+05
max	9.940222e+08	9925.000000	668.270000	524.960000	5.997055e+06	4.509794e+06	1.719922e+06

Corelation between variables

In [8]:
```
data.corr(numeric_only = True)
```

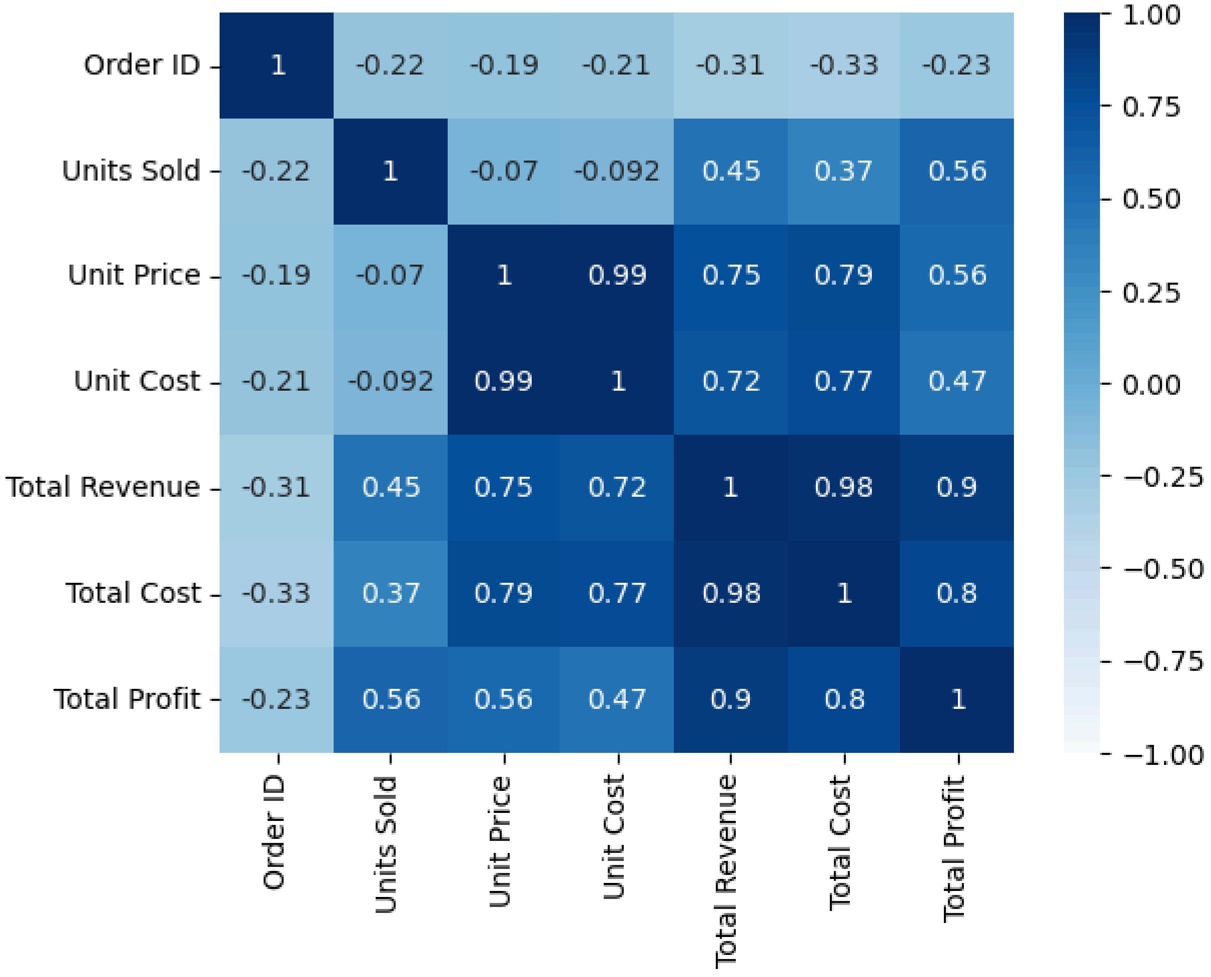
Out[8]:

	Order ID	Units Sold	Unit Price	Unit Cost	Total Revenue	Total Cost	Total Profit
Order ID	1.000000	-0.222907	-0.190941	-0.213201	-0.314688	-0.328944	-0.234638
Units Sold	-0.222907	1.000000	-0.070486	-0.092232	0.447784	0.374746	0.564550
Unit Price	-0.190941	-0.070486	1.000000	0.987270	0.752360	0.787905	0.557365
Unit Cost	-0.213201	-0.092232	0.987270	1.000000	0.715623	0.774895	0.467214
Total Revenue	-0.314688	0.447784	0.752360	0.715623	1.000000	0.983928	0.897327
Total Cost	-0.328944	0.374746	0.787905	0.774895	0.983928	1.000000	0.804091
Total Profit	-0.234638	0.564550	0.557365	0.467214	0.897327	0.804091	1.000000

In [9]:
```
sns.heatmap(data.corr(numeric_only = True),annot = True ,vmin=-1, vmax=1,cmap = 'Blues
```

Out[9]:

```
<Axes: >
```



Revenue and Profit

In [10]:

```python
data.loc[:,['Total Revenue','Total Profit']]
```

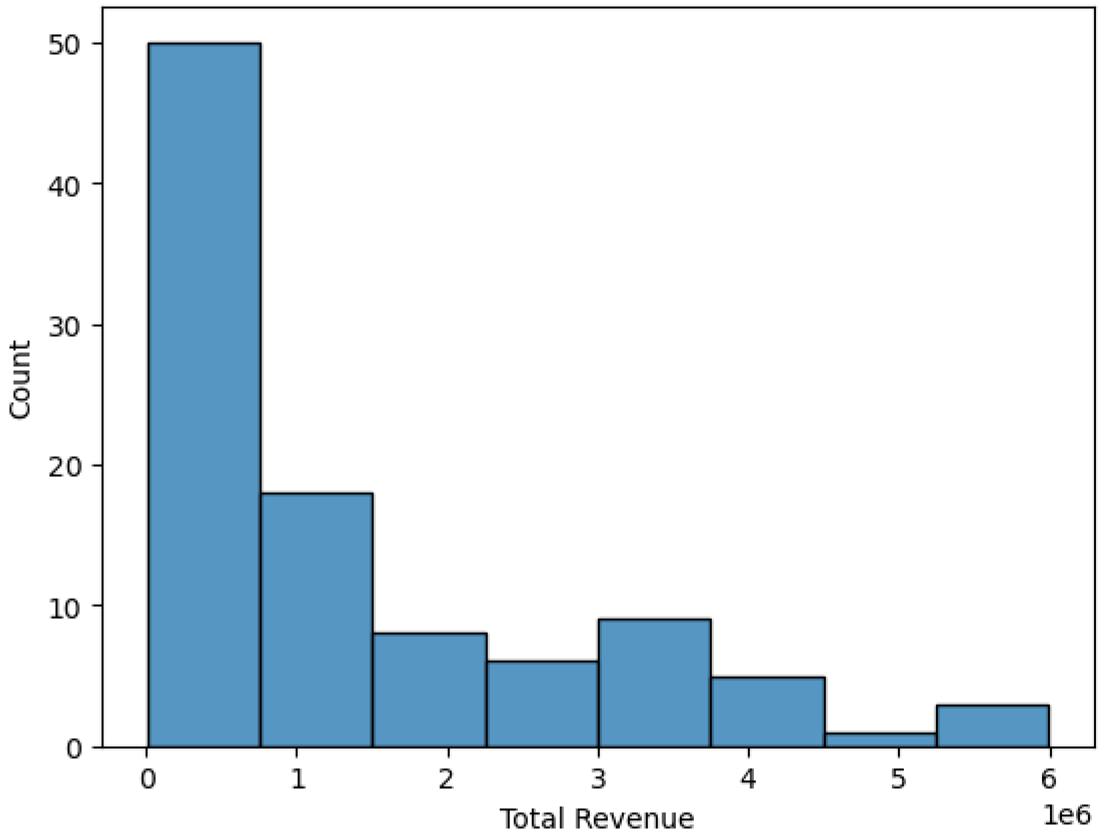
Out[10]:

	Total Revenue	Total Profit
0	2533654.00	951410.50
1	576782.80	248406.36
2	1158502.59	224598.75
3	75591.66	19525.82
4	3296425.02	639077.50
...	...	...
95	97040.64	65214.72
96	58471.11	15103.47
97	228779.10	93748.05
98	471336.91	144521.02
99	3586605.09	889472.91

100 rows × 2 columns

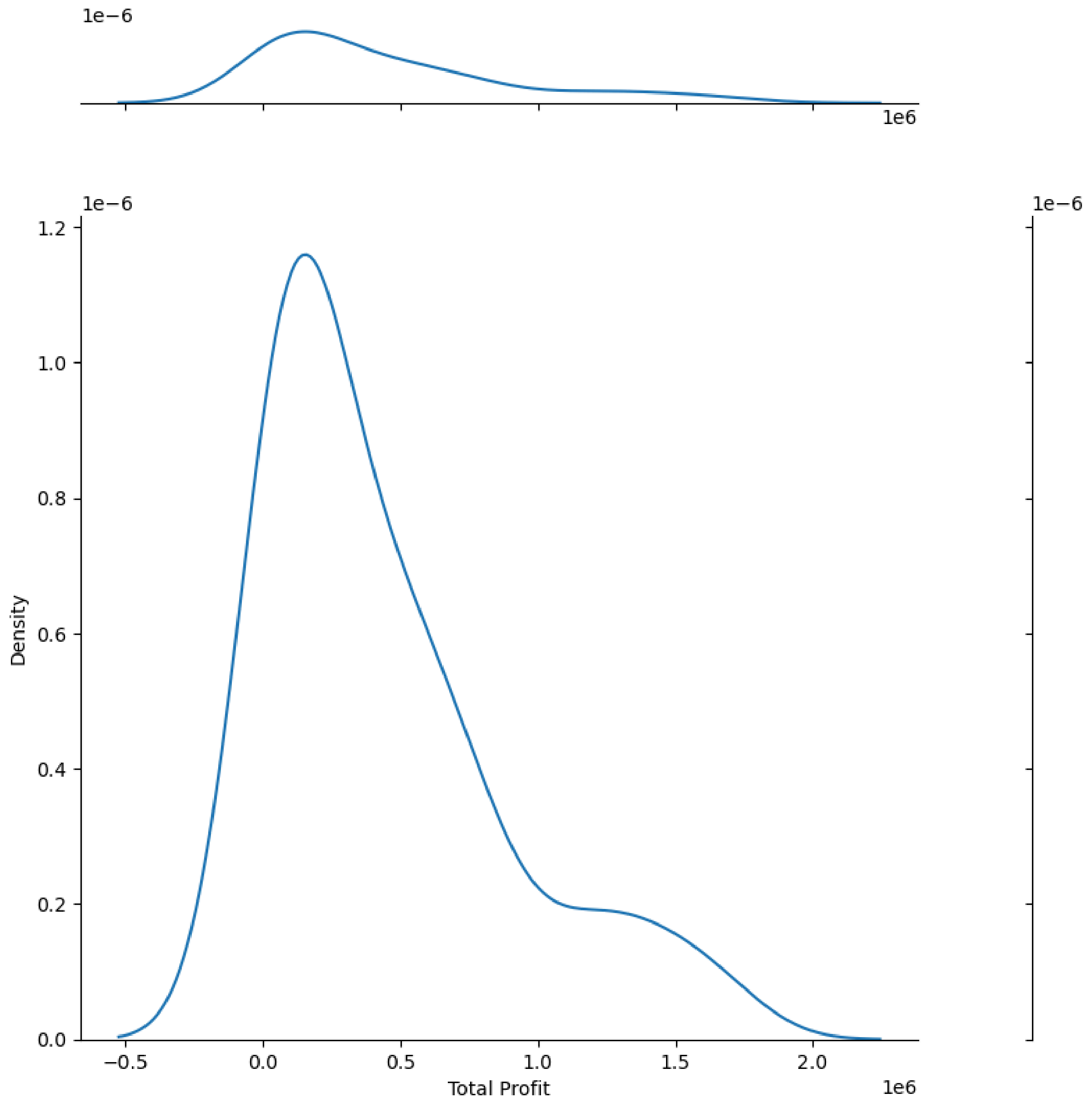
In [11]:
```
sns.histplot(data['Total Revenue'])
```

Out[11]:
```
<Axes: xlabel='Total Revenue', ylabel='Count'>
```



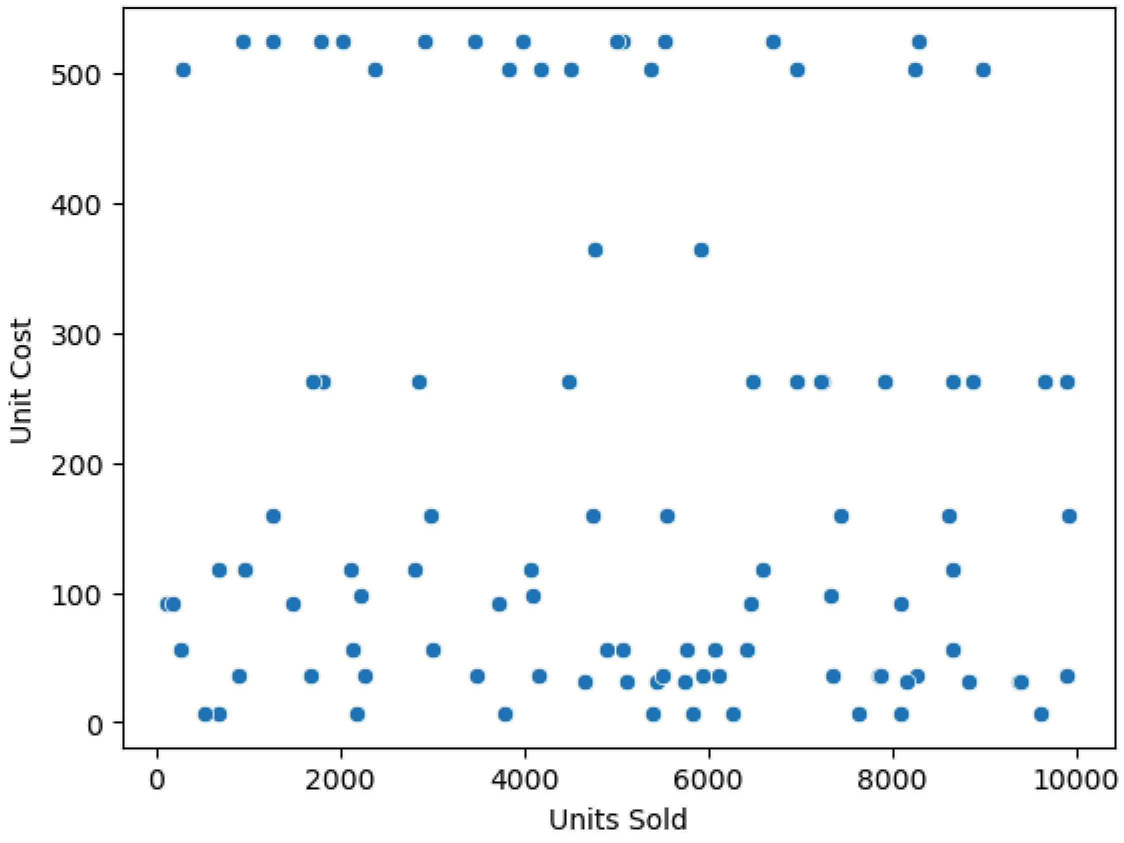
In [12]:
```
sns.jointplot(x='Total Profit',data=data,height=8,ratio=5,kind='kde',space=1.5)
```

Out[12]:
```
<seaborn.axisgrid.JointGrid at 0x299b25abd50>
```



```
In [13]: sns.scatterplot(data = data , x = "Units Sold" , y = 'Unit Cost')
```

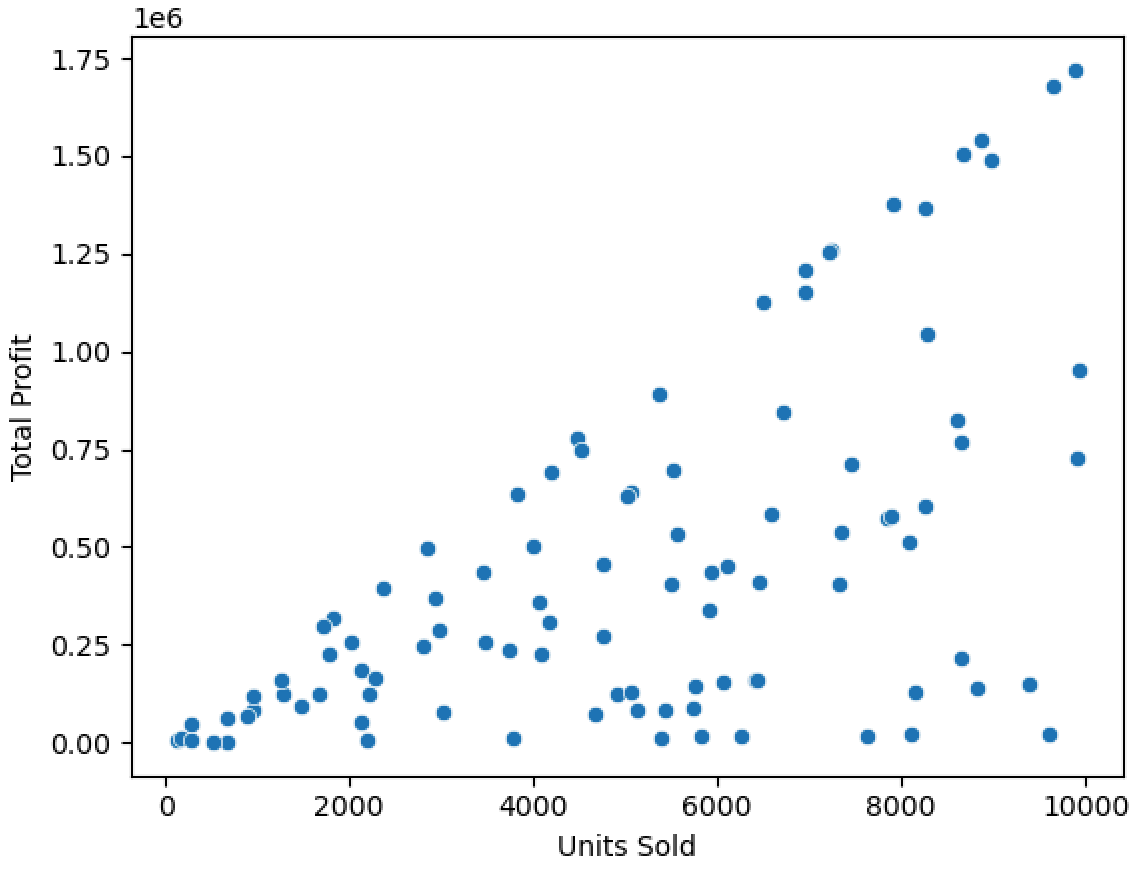
```
Out[13]: <Axes: xlabel='Units Sold', ylabel='Unit Cost'>
```



- The above scatter plot implies that the two variables ''Units Sold" and "Unit Cost" are inversely proportional to each other. when the Cost of the product increase, the units of a product sold less

```
In [14]: sns.scatterplot(data = data , x = "Units Sold" , y = 'Total Profit')
```

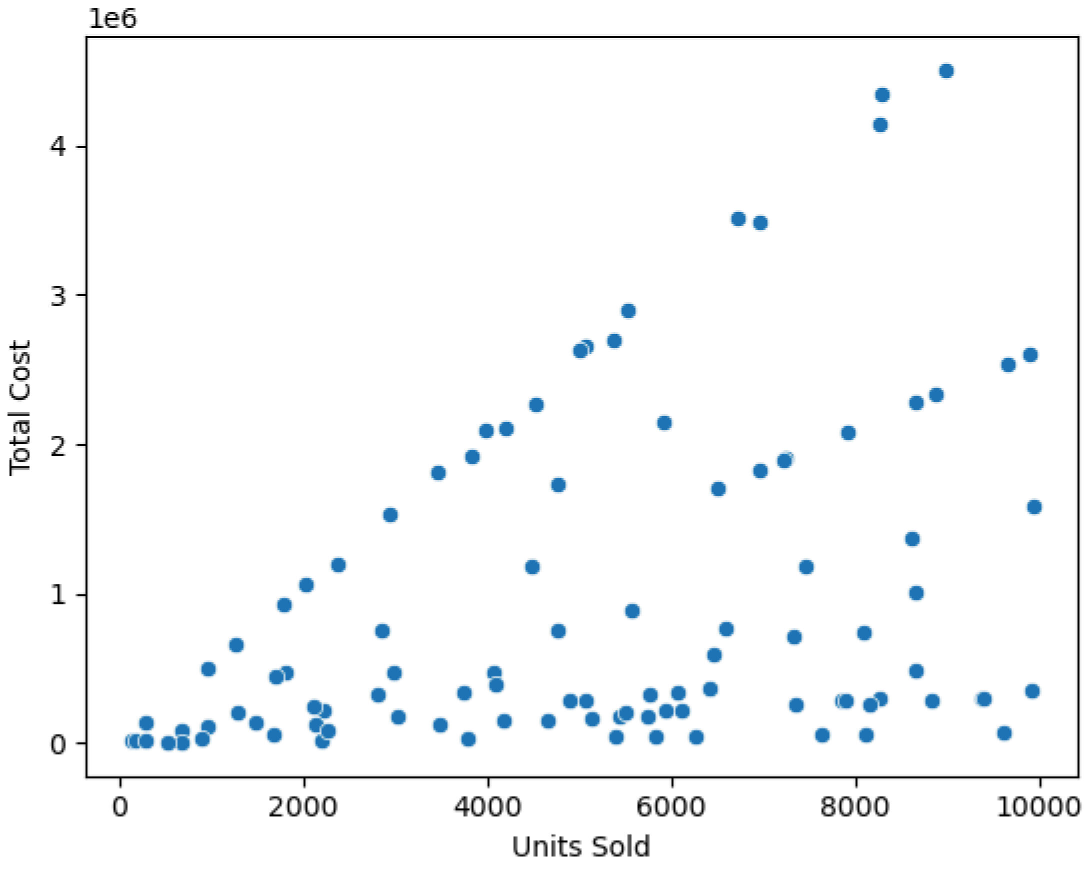
```
Out[14]: <Axes: xlabel='Units Sold', ylabel='Total Profit'>
```



- Maximum profit has been generated when the number of units sold were between 8000 and 10000 i.e. more the number of units sold, more will be the profit generated.

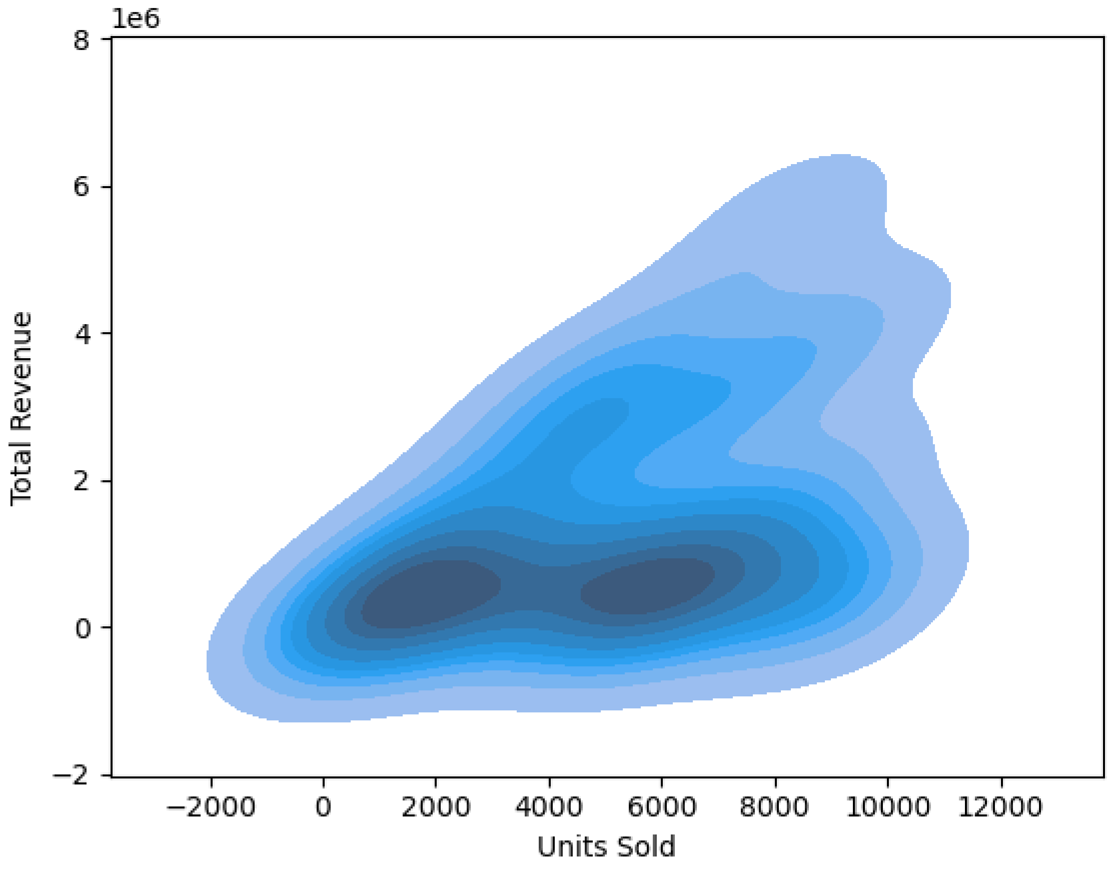
```
In [15]: sns.scatterplot(data = data , x = "Units Sold" , y = 'Total Cost')
```

```
Out[15]: <Axes: xlabel='Units Sold', ylabel='Total Cost'>
```



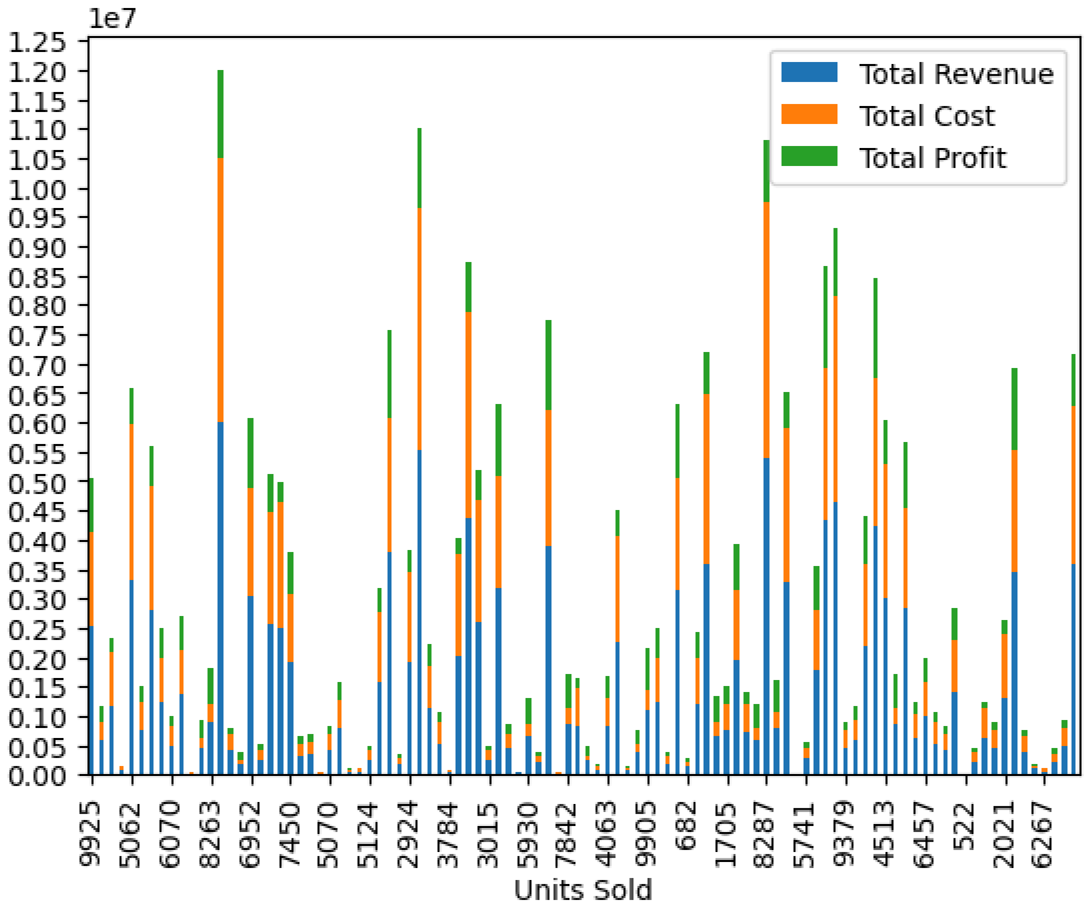
```
In [16]: sns.kdeplot(data = data , x = "Units Sold" , y = 'Total Revenue', fill = True)
```

```
Out[16]: <Axes: xlabel='Units Sold', ylabel='Total Revenue'>
```



- Maximum revenue has been generated when 5000-6500 units of a product were sold.

```
In [17]: data.plot.bar(x='Units Sold',y=['Total Revenue','Total Cost','Total Profit'],stacked=T
         plt.xticks(rotation=90)
         plt.locator_params(nbins=28)
```



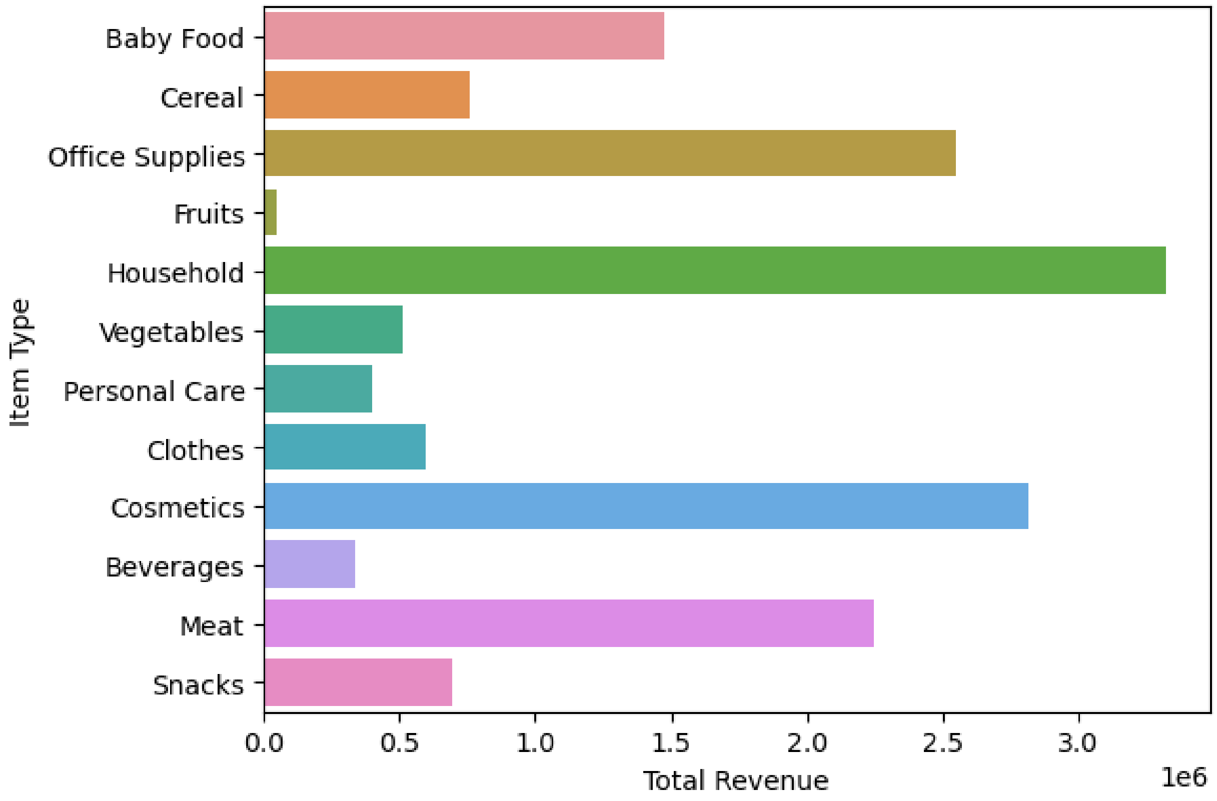
In [18]:
```
data['Item Type'].unique()
```

Out[18]:
```
array(['Baby Food', 'Cereal', 'Office Supplies', 'Fruits', 'Household',
       'Vegetables', 'Personal Care', 'Clothes', 'Cosmetics', 'Beverages',
       'Meat', 'Snacks'], dtype=object)
```

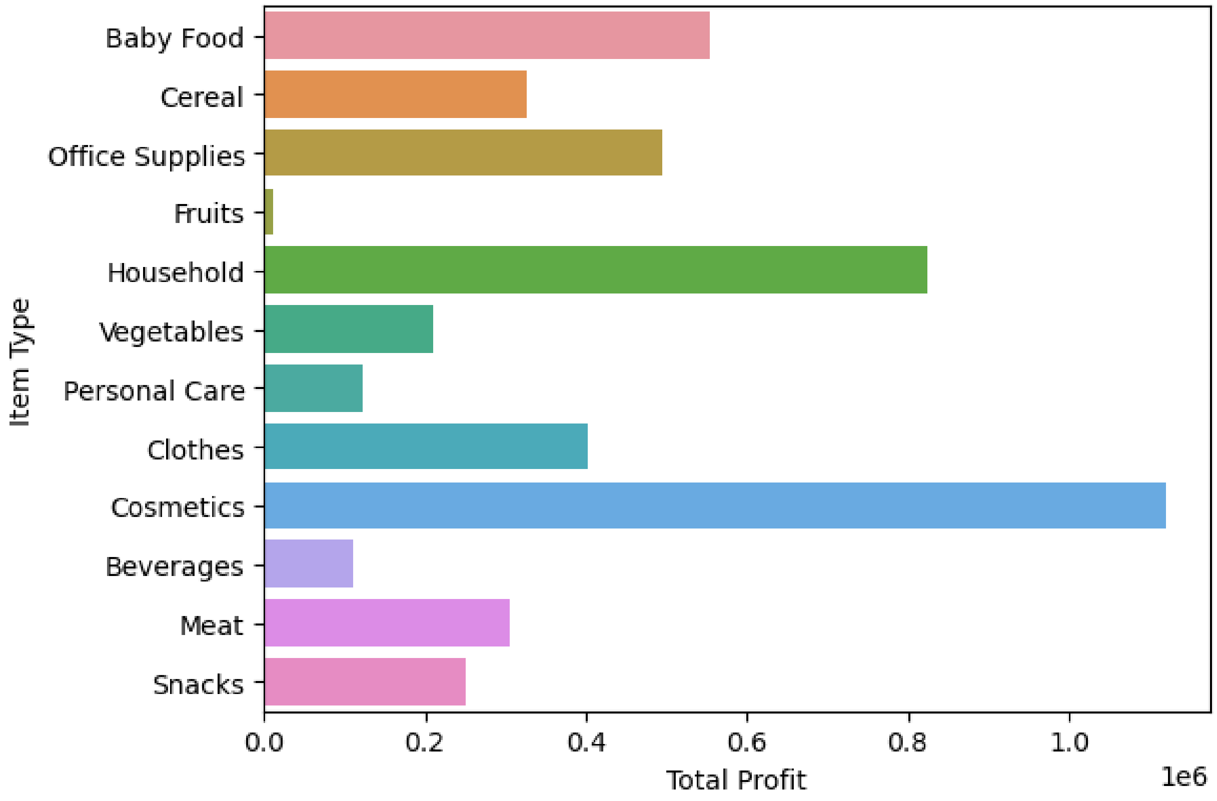
In [19]:
```
len(data['Item Type'].unique())
```

Out[19]:
```
12
```

In [20]:
```
sns.barplot(data = data, y ='Item Type' , x = 'Total Revenue' ,orient = 'h',errorbar=N

plt.show()
```



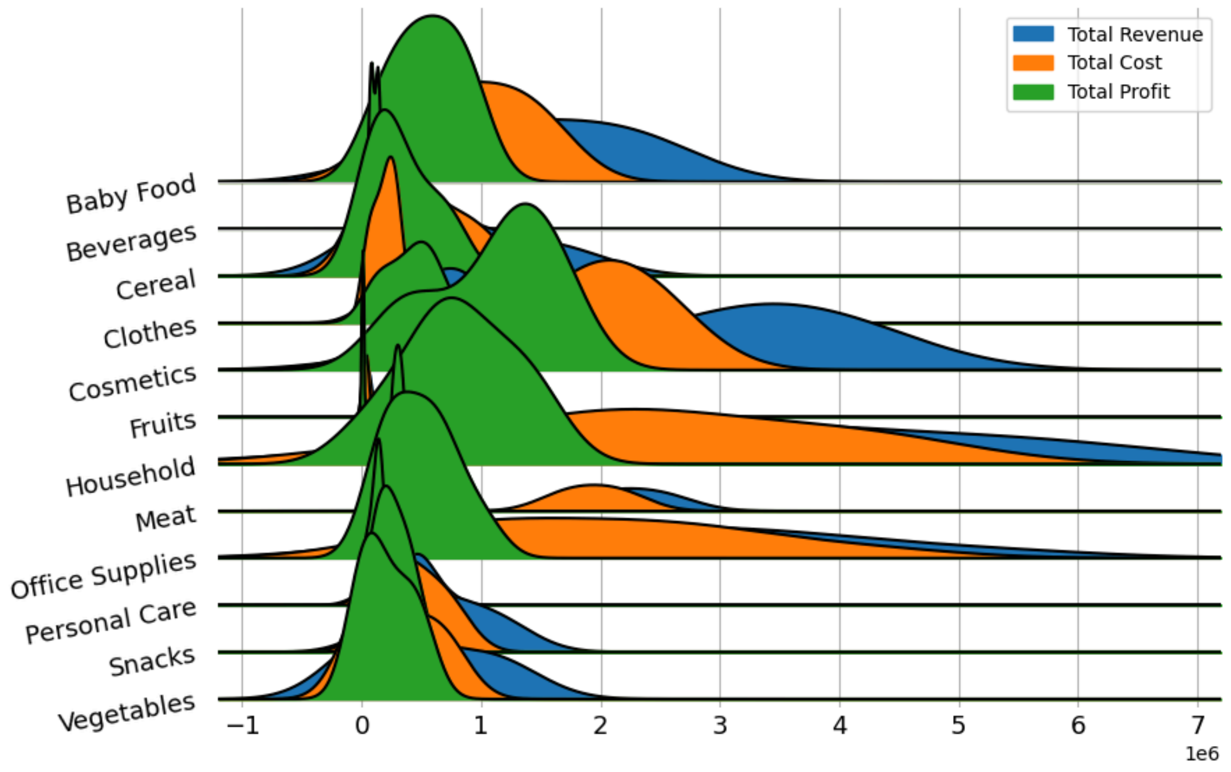
In [21]:
```
sns.barplot(data = data, y ='Item Type' , x = 'Total Profit' ,orient = 'h',errorbar=No
plt.show()
```



In [ ]:

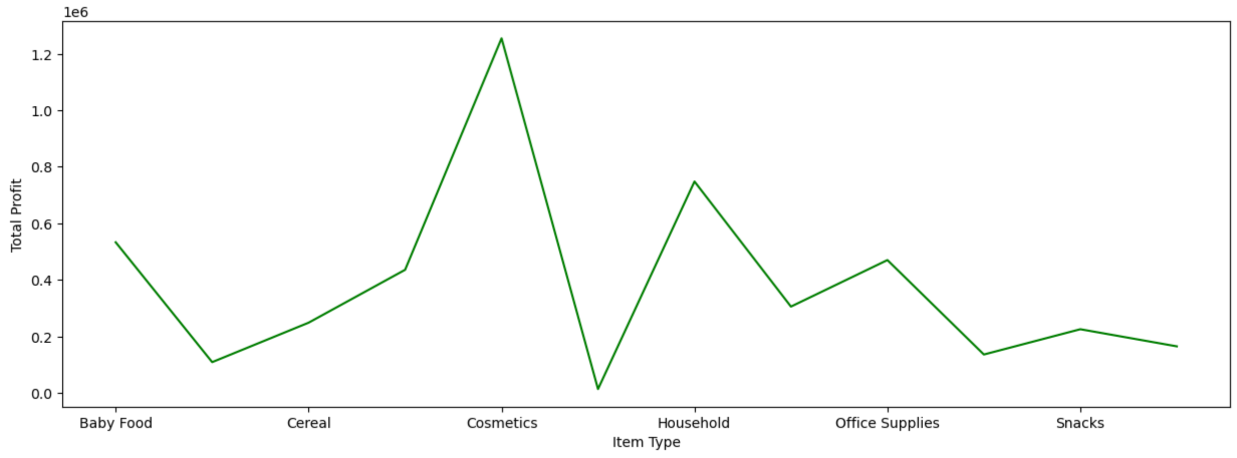
In [22]:
```
import joypy

joypy.joyplot(data,column=['Total Revenue','Total Cost','Total Profit'],by='Item Type'
```

Out[22]:
```
(<Figure size 900x600 with 13 Axes>,
 [<Axes: >,
  <Axes: >,
  <Axes: >,
  <Axes: >,
  <Axes: >,
  <Axes: >,
  <Axes: >,
  <Axes: >,
  <Axes: >,
  <Axes: >,
  <Axes: >,
  <Axes: >,
  <Axes: >])
```



In [23]:
```
pd.pivot_table(data,index='Item Type',values='Total Profit',aggfunc=np.median).plot(ki
plt.ylabel('Total Profit')
```

Out[23]:
```
Text(0, 0.5, 'Total Profit')
```



In [24]:
```
data.head()
```

Out[24]:

	Order ID	Order Date	Order Priority	Ship Date	Item Type	Region	Country	Sales Channel	Units Sold	Unit Price	
0	669165933	5/28/2010	H	6/27/2010	Baby Food	Australia and Oceania	Tuvalu	Offline	9925	255.28	15
1	963881480	8/22/2012	C	9/15/2012	Cereal	Central America and the Caribbean	Grenada	Online	2804	205.70	11
2	341417157	5/2/2014	L	5/8/2014	Office Supplies	Europe	Russia	Offline	1779	651.21	52
3	514321792	6/20/2014	C	7/5/2014	Fruits	Sub-Saharan Africa	Sao Tome and Principe	Online	8102	9.33	
4	115456712	2/1/2013	L	2/6/2013	Office Supplies	Sub-Saharan Africa	Rwanda	Offline	5062	651.21	52

In [25]:
```
data['Year'] = data['Order Date'].apply(lambda x: int(x[-4:]))

data
```

Out[25]:

	Order ID	Order Date	Order Priority	Ship Date	Item Type	Region	Country	Sales Channel	Units Sold
0	669165933	5/28/2010	H	6/27/2010	Baby Food	Australia and Oceania	Tuvalu	Offline	9925
1	963881480	8/22/2012	C	9/15/2012	Cereal	Central America and the Caribbean	Grenada	Online	2804
2	341417157	5/2/2014	L	5/8/2014	Office Supplies	Europe	Russia	Offline	1779
3	514321792	6/20/2014	C	7/5/2014	Fruits	Sub-Saharan Africa	Sao Tome and Principe	Online	8102
4	115456712	2/1/2013	L	2/6/2013	Office Supplies	Sub-Saharan Africa	Rwanda	Offline	5062
...	...	...	...	...	...	...	...	...	...
95	512878119	7/26/2011	M	9/3/2011	Clothes	Sub-Saharan Africa	Mali	Online	888
96	810711038	11/11/2011	L	12/28/2011	Fruits	Asia	Malaysia	Offline	6267
97	728815257	6/1/2016	C	6/29/2016	Vegetables	Sub-Saharan Africa	Sierra Leone	Offline	1485
98	559427106	7/30/2015	M	8/8/2015	Personal Care	North America	Mexico	Offline	5767
99	665095412	2/10/2012	L	2/15/2012	Household	Sub-Saharan Africa	Mozambique	Offline	5367

100 rows × 15 columns

Year wise Analysis

In [26]:

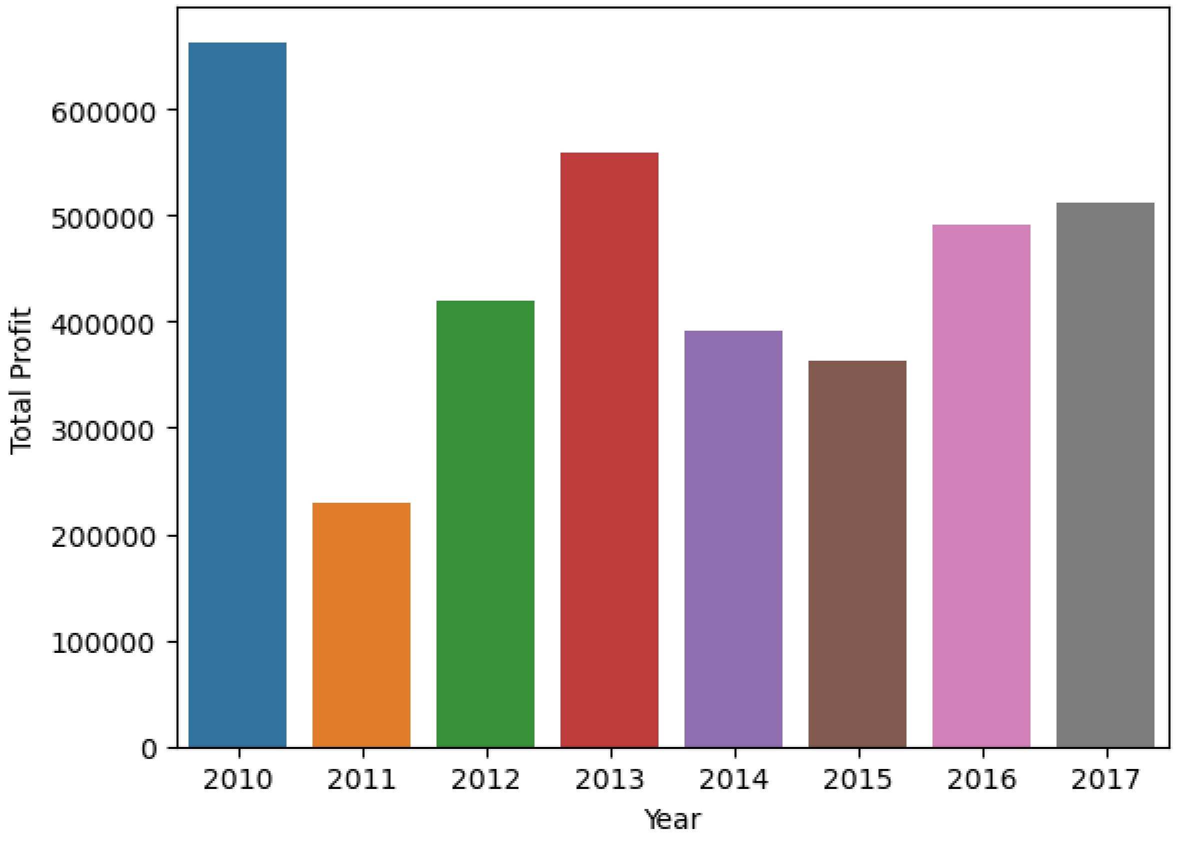
```
YearWise = data[['Year', 'Total Profit','Total Revenue']]
YearWise
```

Out[26]:

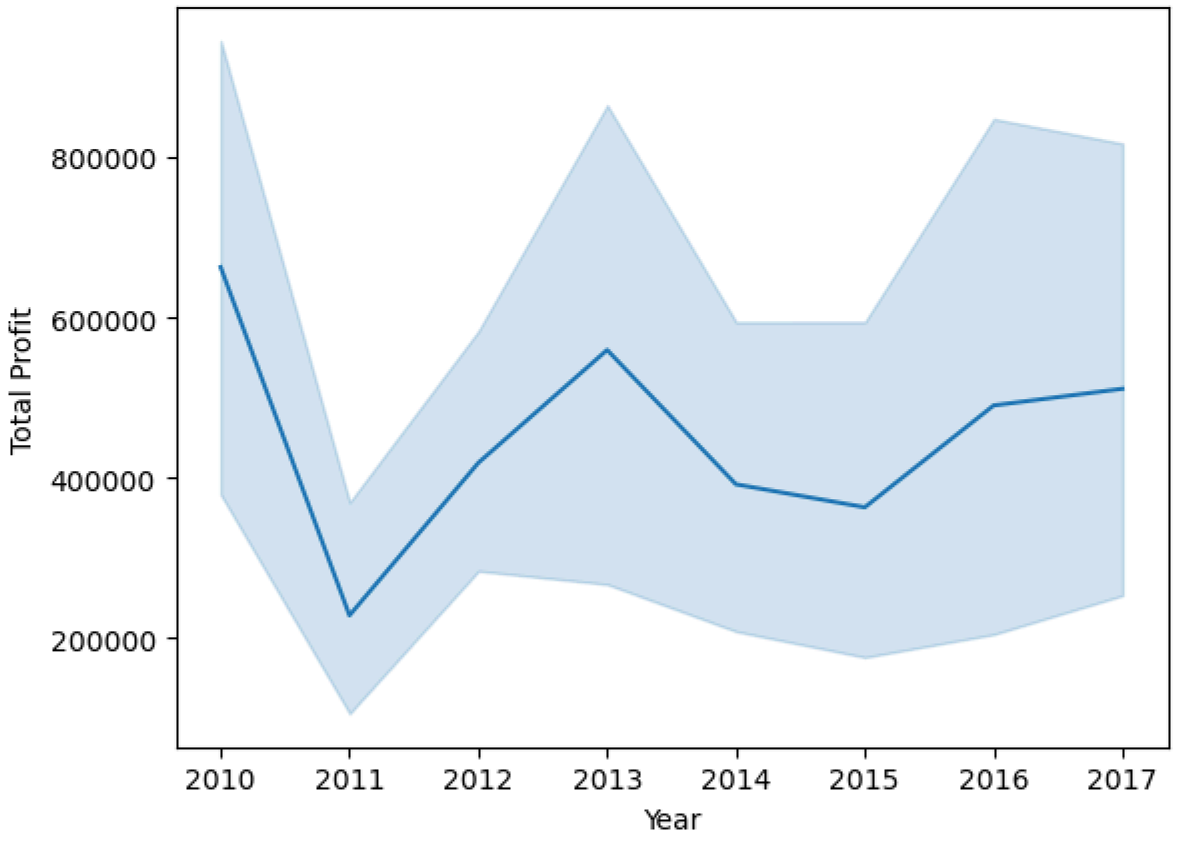
	Year	Total Profit	Total Revenue
0	2010	951410.50	2533654.00
1	2012	248406.36	576782.80
2	2014	224598.75	1158502.59
3	2014	19525.82	75591.66
4	2013	639077.50	3296425.02
...	...	...	...
95	2011	65214.72	97040.64
96	2011	15103.47	58471.11
97	2016	93748.05	228779.10
98	2015	144521.02	471336.91
99	2012	889472.91	3586605.09

100 rows × 3 columns

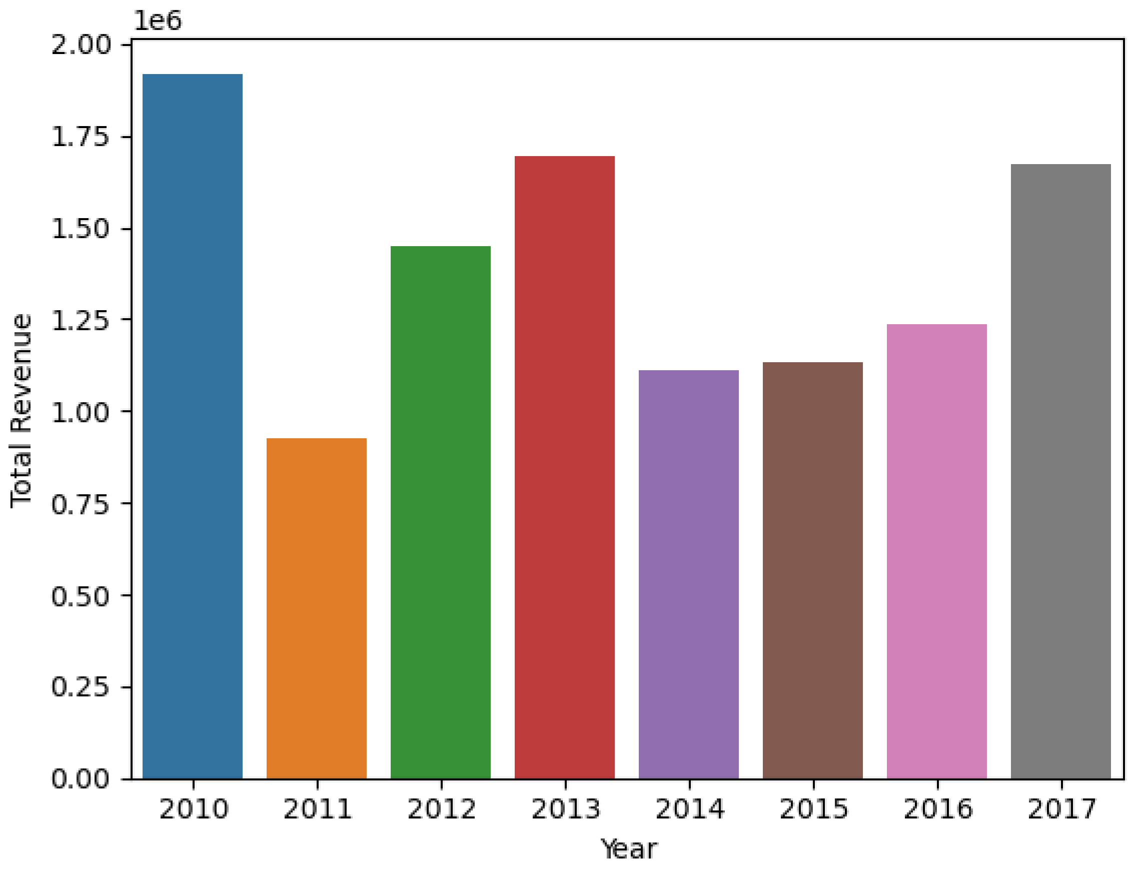
In [27]:
```
sns.barplot(data = YearWise, y ='Total Profit' , x = 'Year' ,errorbar=None  )

plt.show()
```



In [28]:
```
sns.lineplot(data = YearWise, y ='Total Profit' , x = 'Year'    )

plt.show()
```

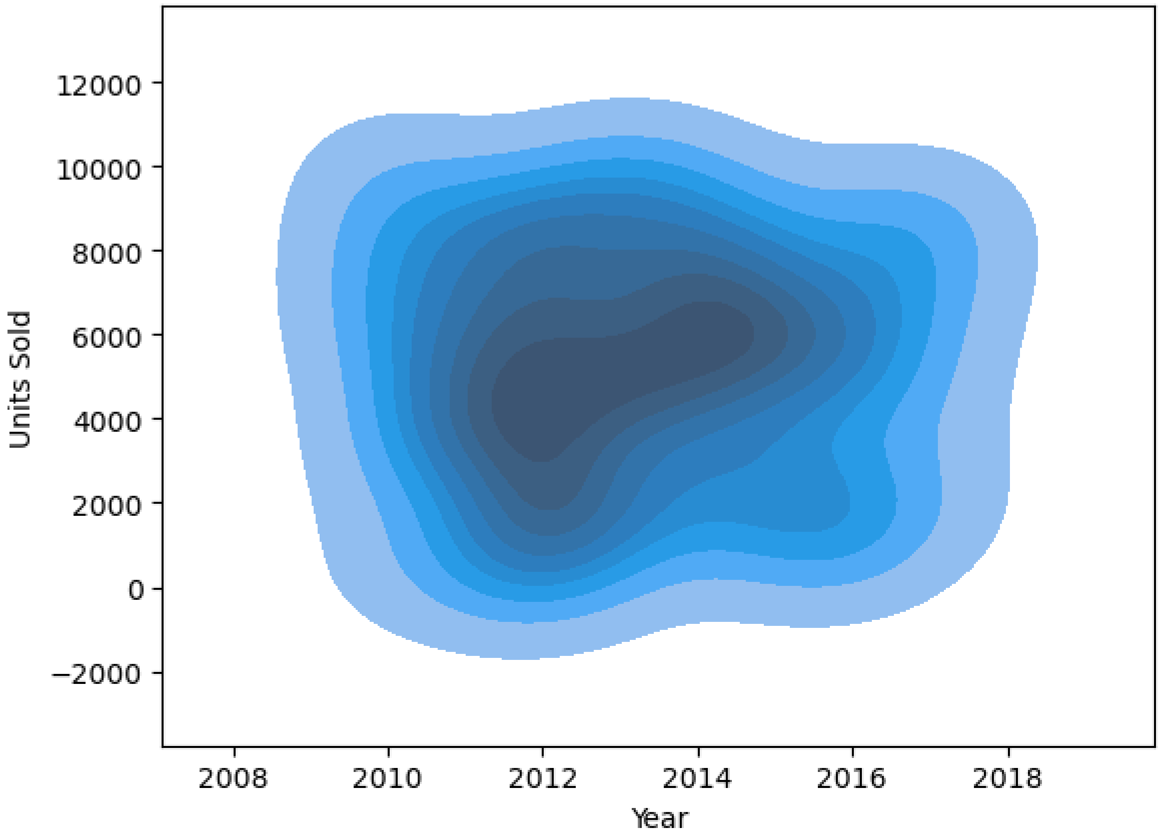


In [29]:
```
sns.barplot(data = YearWise, y ='Total Revenue' , x = 'Year' ,errorbar=None  )

plt.show()
```



In [30]:
```
sns.kdeplot(x='Year',y='Units Sold',data=data,fill=True,cut=3)
```

Out[30]:
```
<Axes: xlabel='Year', ylabel='Units Sold'>
```

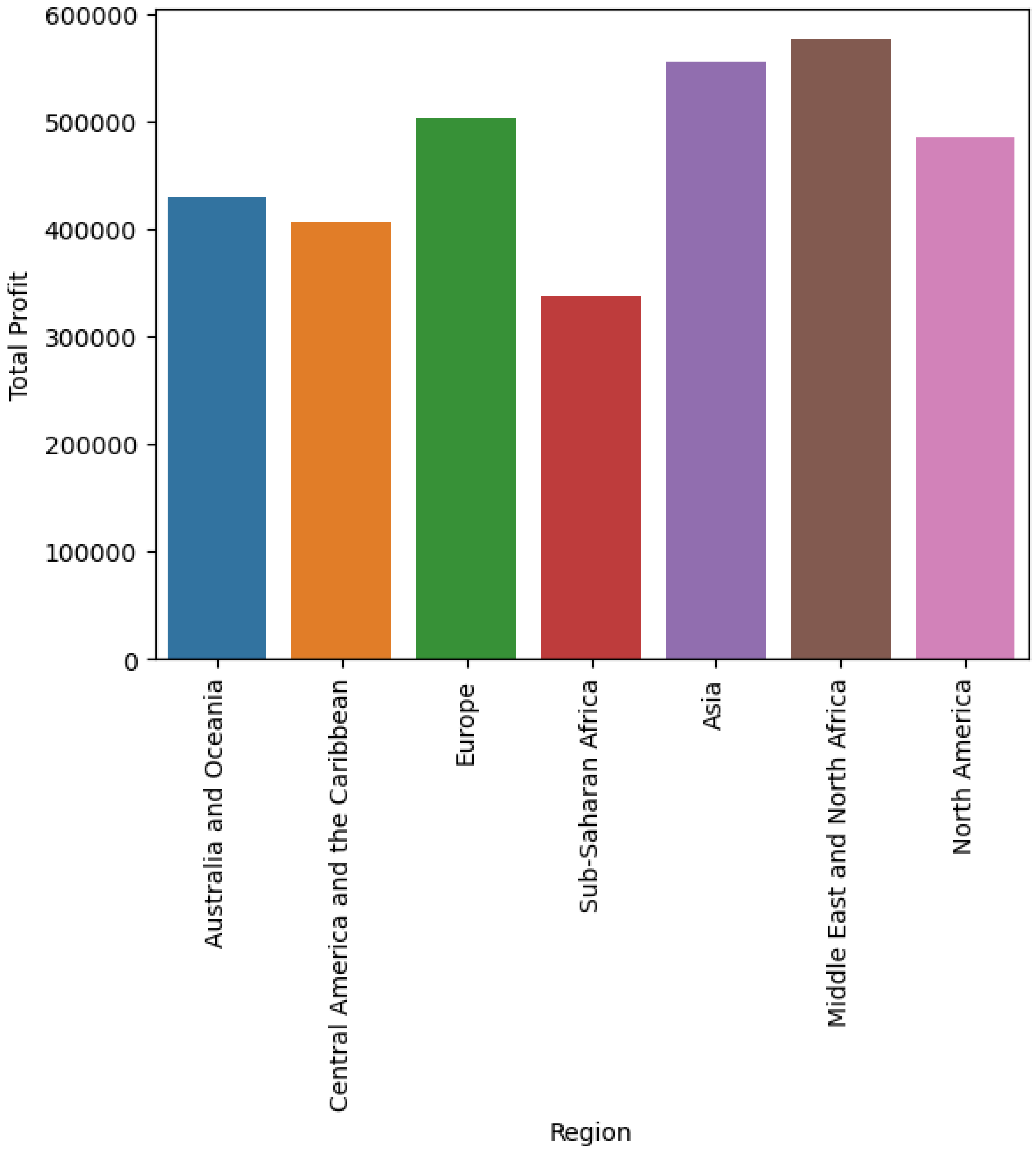


Region wise Analysis

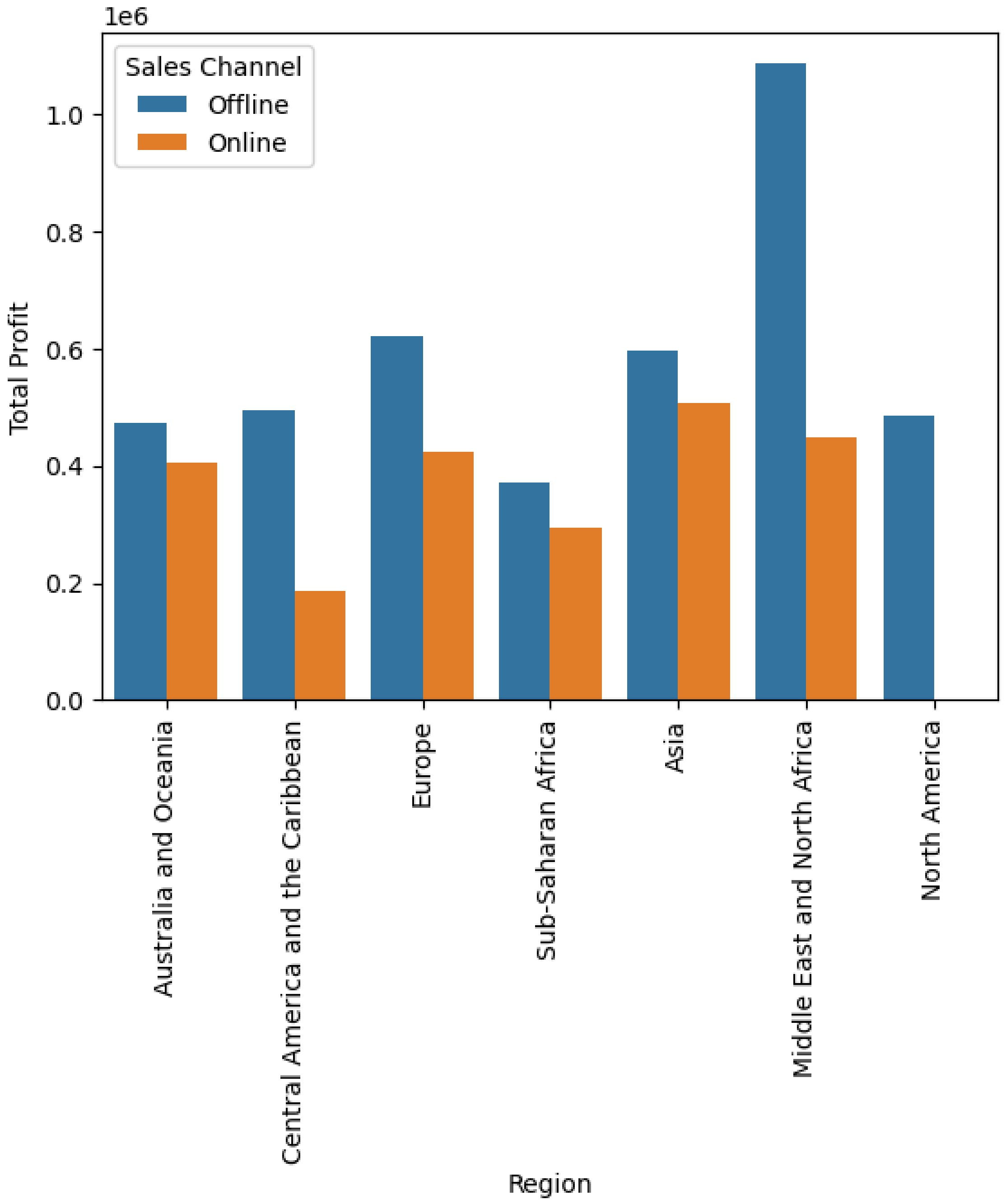
In [31]:
```
data['Region'].unique()
```

Out[31]:
```
array(['Australia and Oceania', 'Central America and the Caribbean',
       'Europe', 'Sub-Saharan Africa', 'Asia',
       'Middle East and North Africa', 'North America'], dtype=object)
```

In [32]:
```
sns.barplot(data = data, x = 'Region',y ='Total Profit'  ,errorbar=None  )
plt.xticks(rotation=90)
plt.show()
```

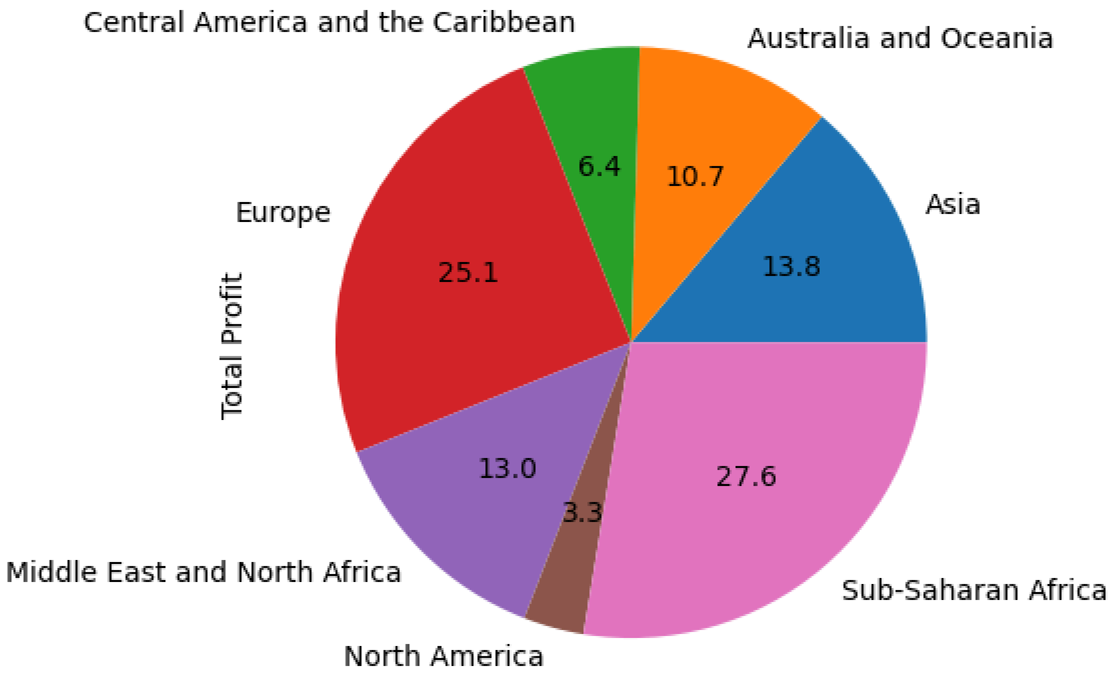


```
In [33]: sns.barplot(data = data, x = 'Region',y ='Total Profit',hue = 'Sales Channel'  ,errorb
         plt.xticks(rotation=90)
         plt.show()
```

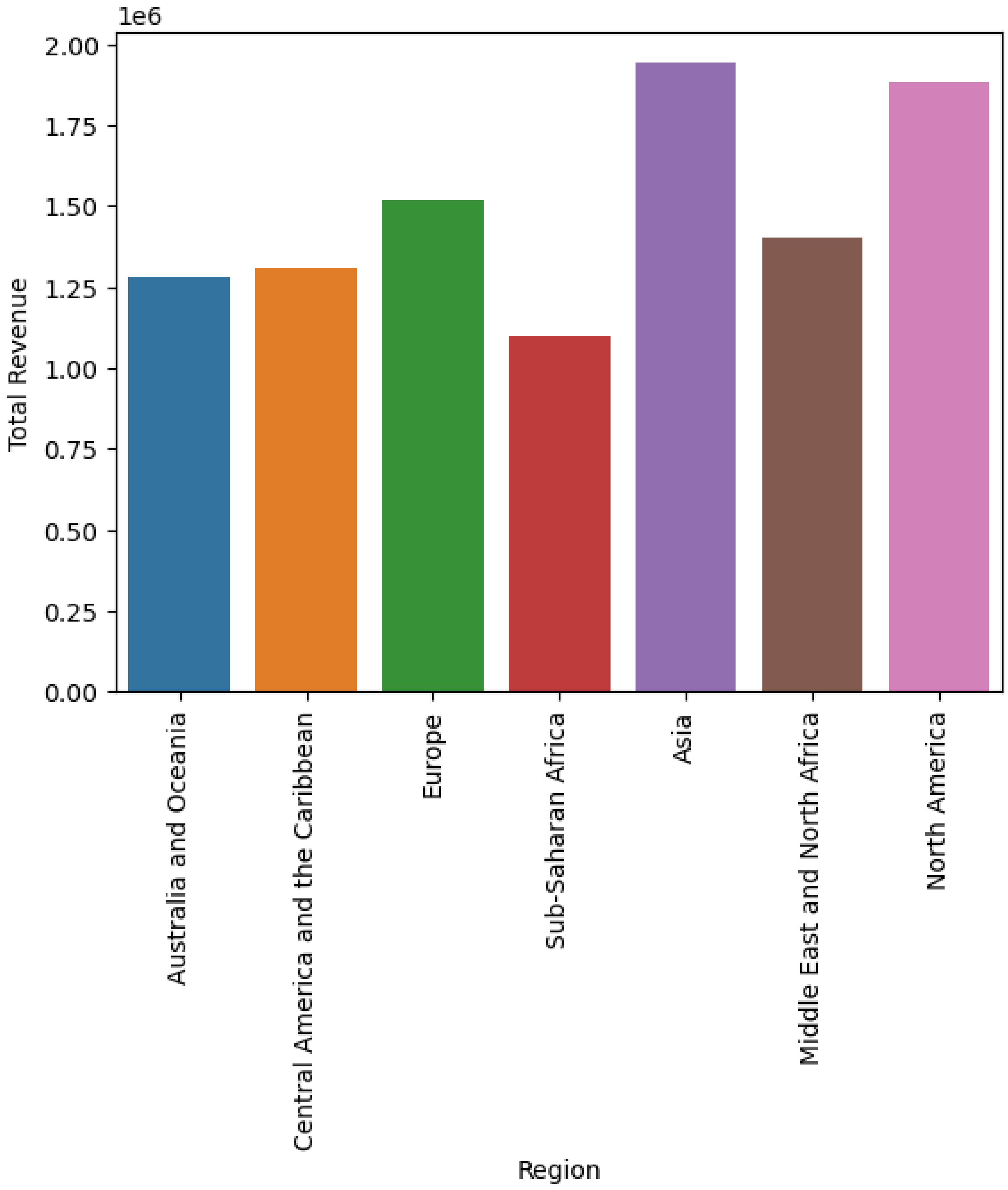


```
In [34]: data.groupby('Region')['Total Profit'].sum().plot(kind = 'pie', autopct = '%.1f')
```

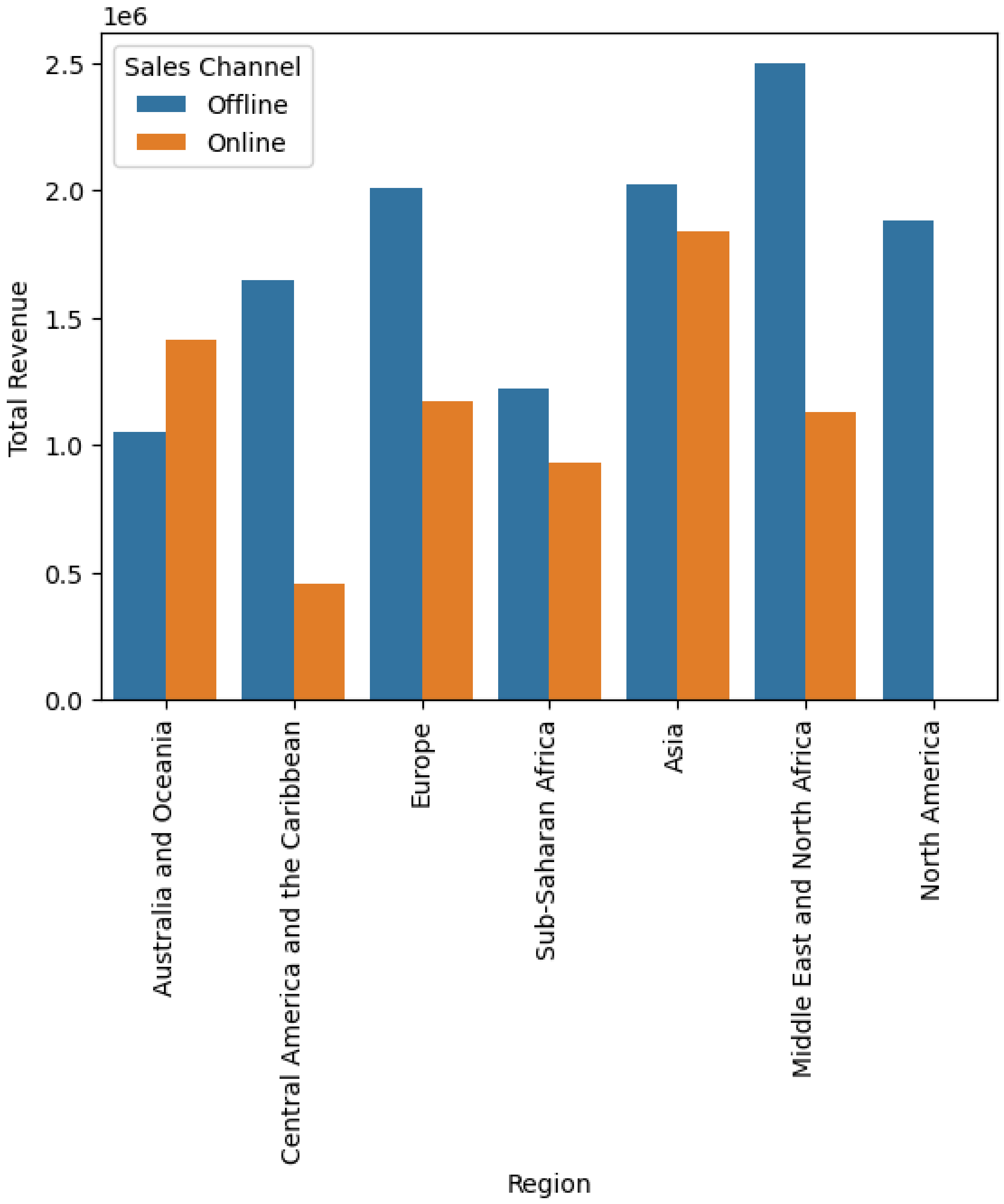
```
Out[34]: <Axes: ylabel='Total Profit'>
```



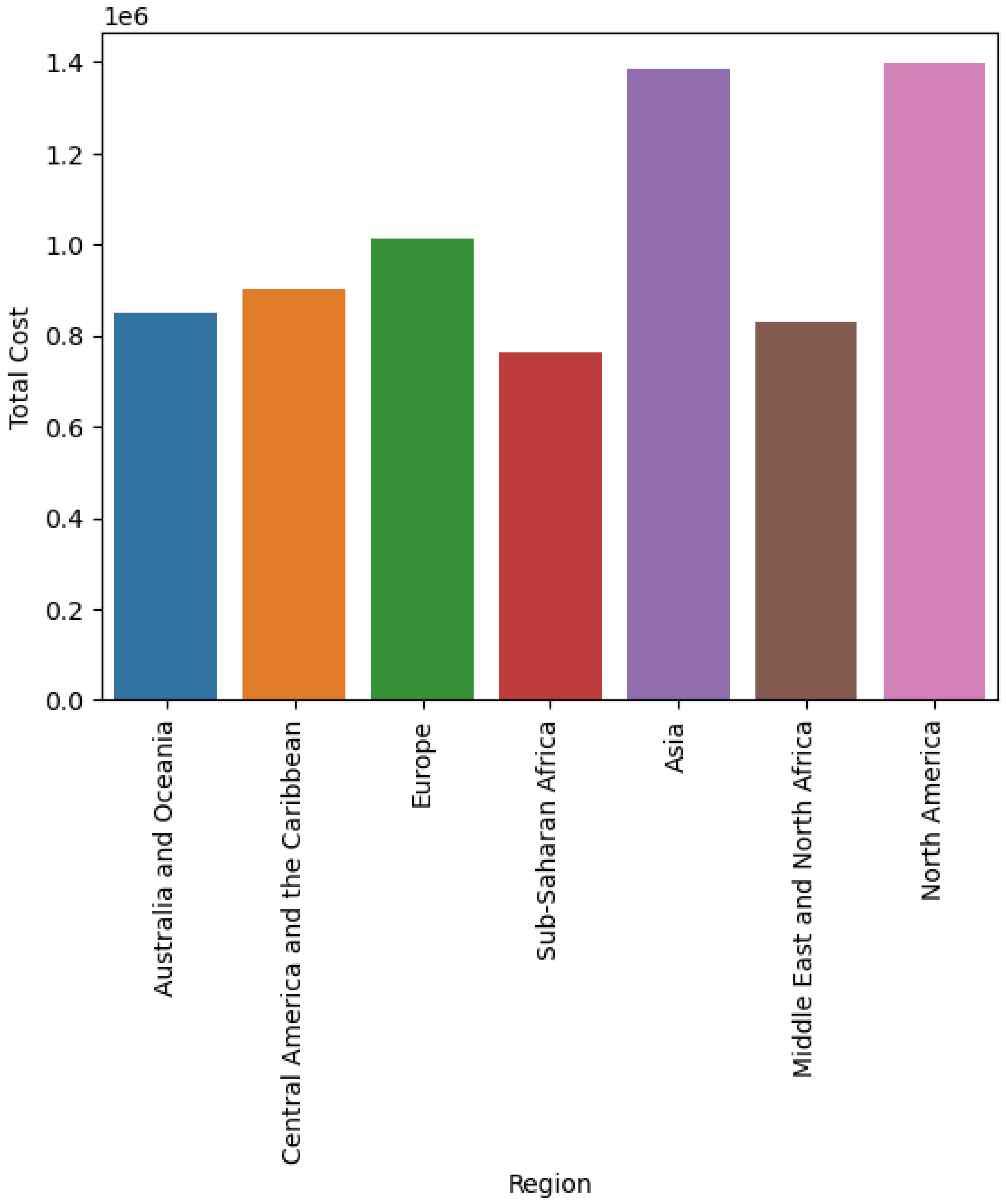
```
In [35]: sns.barplot(data = data, x = 'Region',y ='Total Revenue'  ,errorbar=None  )
         plt.xticks(rotation=90)
         plt.show()
```



In [36]:
```
sns.barplot(data = data, x = 'Region',y ='Total Revenue', hue = 'Sales Channel' ,error
plt.xticks(rotation=90)
plt.show()
```



In [37]:
```
sns.barplot(data = data, x = 'Region',y ='Total Cost'  ,errorbar=None  )
plt.xticks(rotation=90)
plt.show()
```



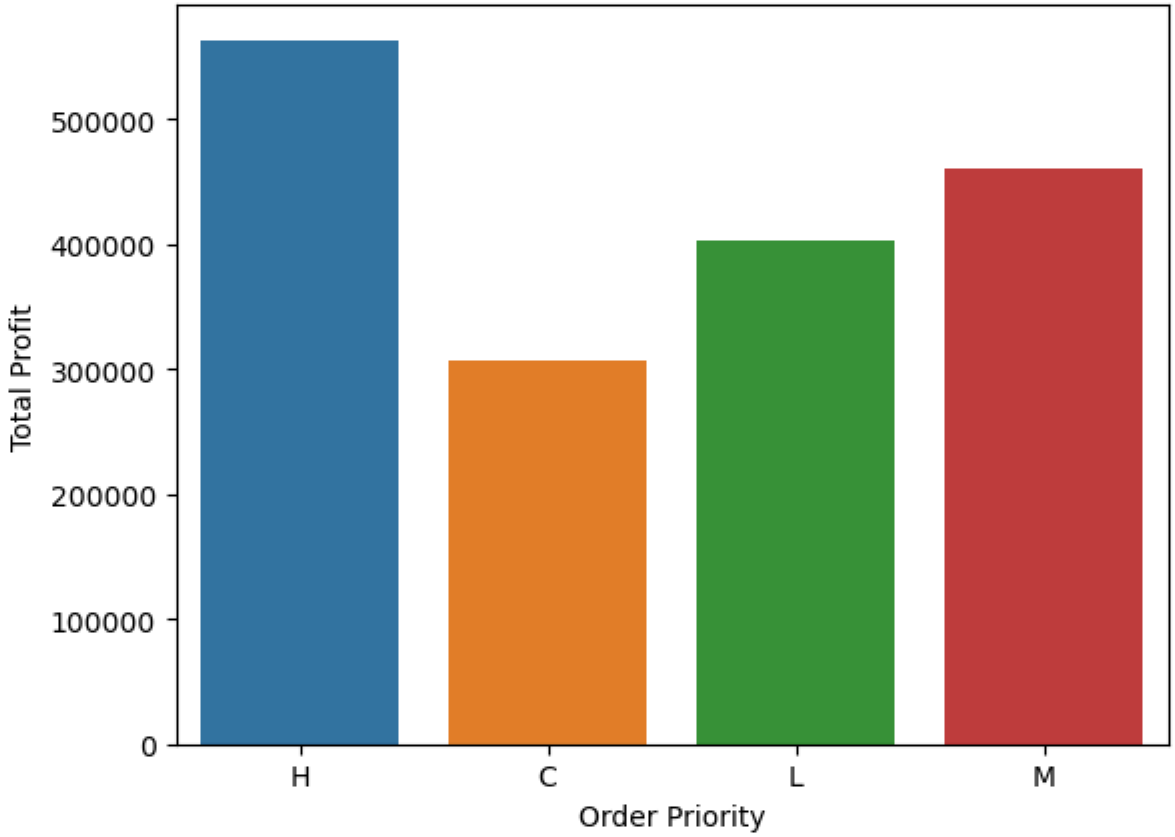
Order Priority

```
In [38]: data['Order Priority'].unique()
```

```
Out[38]: array(['H', 'C', 'L', 'M'], dtype=object)
```

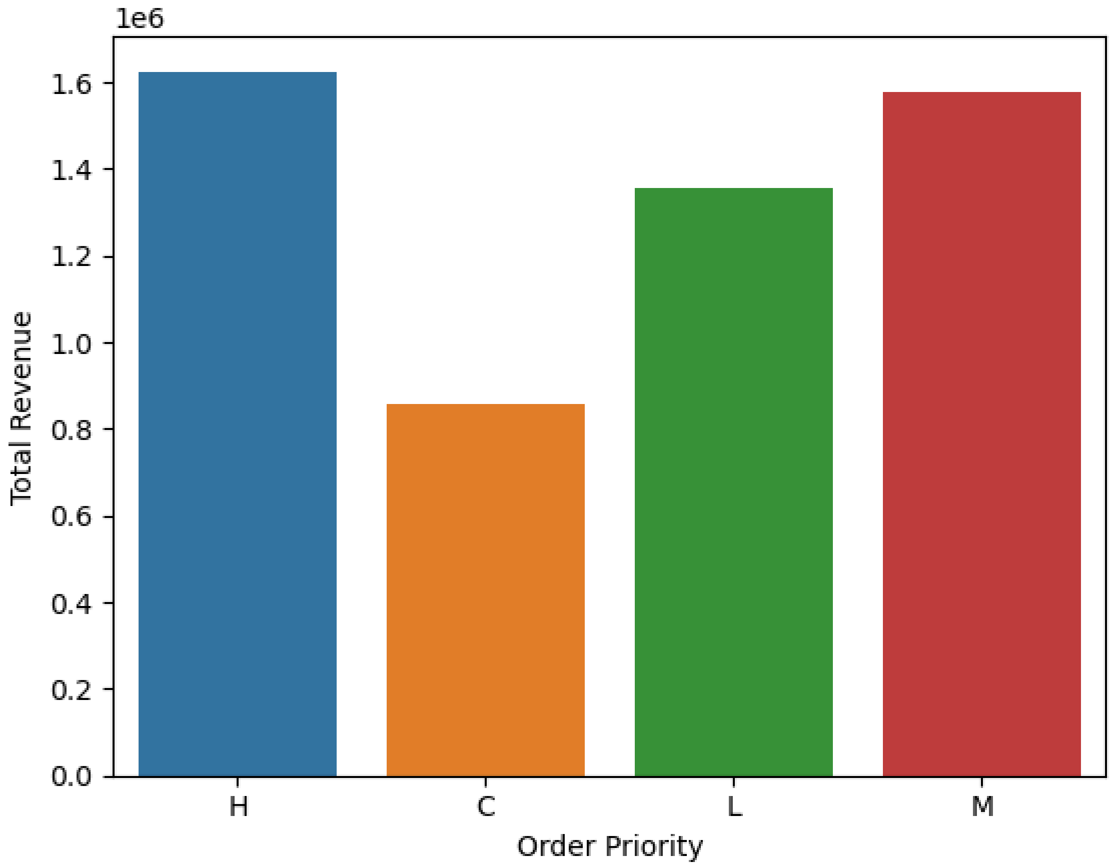
```
In [39]: sns.barplot(data = data, x = 'Order Priority', y = 'Total Profit',errorbar=None)
```

```
Out[39]: <Axes: xlabel='Order Priority', ylabel='Total Profit'>
```



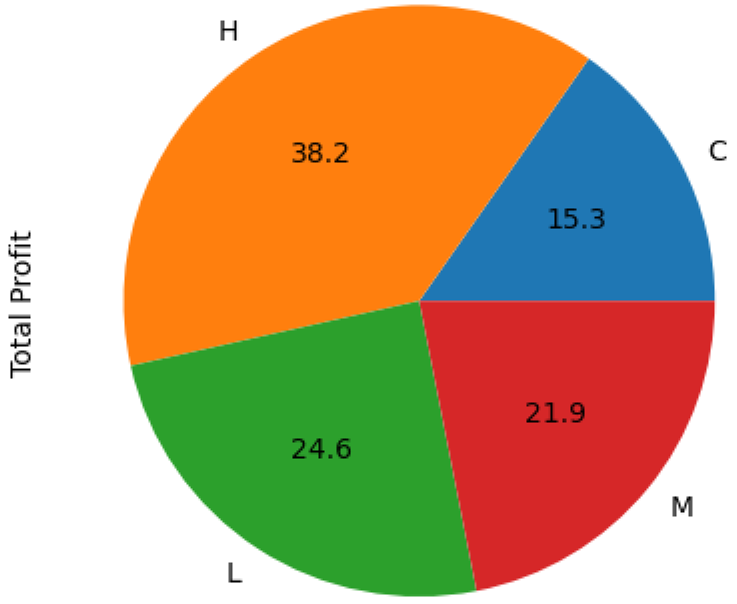
```
In [40]: sns.barplot(data = data, x = 'Order Priority', y = 'Total Revenue',errorbar=None)
```

```
Out[40]: <Axes: xlabel='Order Priority', ylabel='Total Revenue'>
```



In [41]:
```
data.groupby('Order Priority')['Total Profit'].sum().plot(kind = 'pie', autopct = '%.1
```

Out[41]:
```
<Axes: ylabel='Total Profit'>
```



Unit Cost Analsis

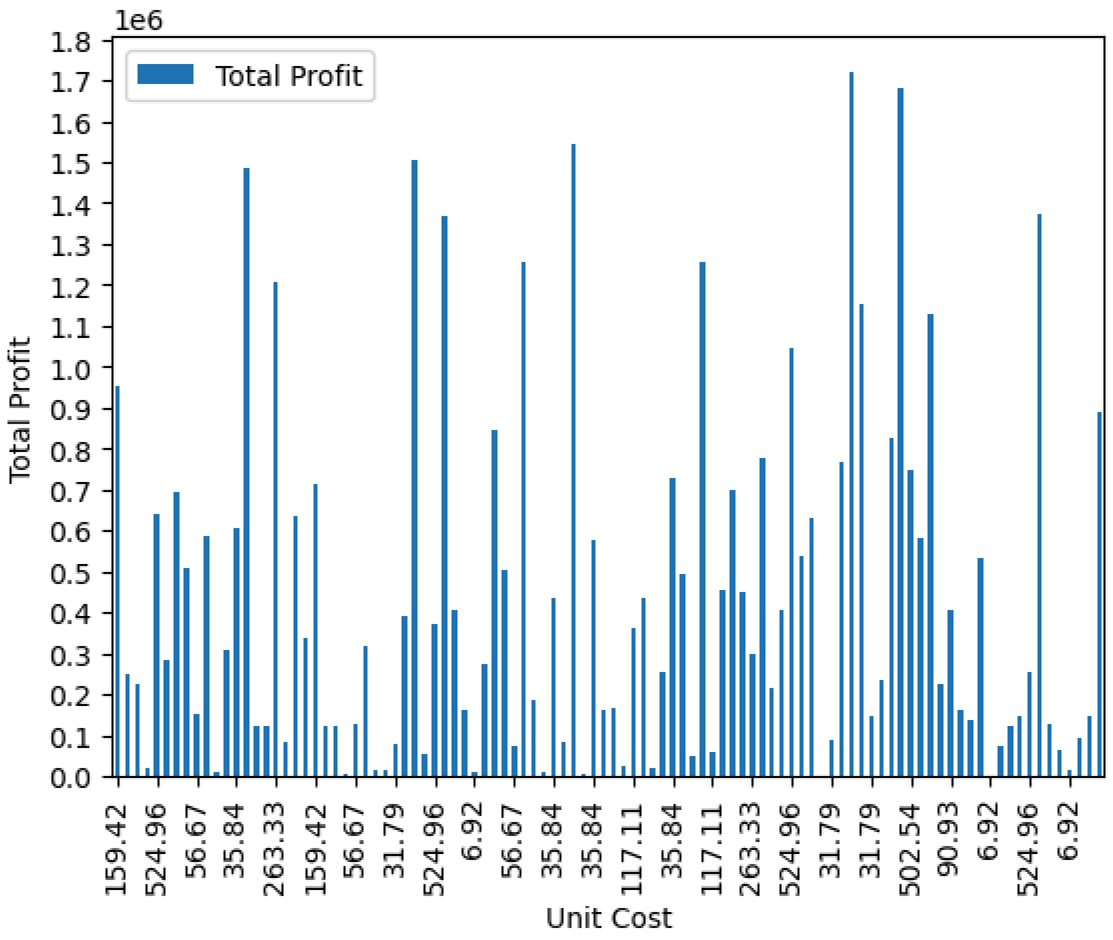
In [42]:
```
data.head()
```

Out[42]:

	Order ID	Order Date	Order Priority	Ship Date	Item Type	Region	Country	Sales Channel	Units Sold	Unit Price	
0	669165933	5/28/2010	H	6/27/2010	Baby Food	Australia and Oceania	Tuvalu	Offline	9925	255.28	15
1	963881480	8/22/2012	C	9/15/2012	Cereal	Central America and the Caribbean	Grenada	Online	2804	205.70	11
2	341417157	5/2/2014	L	5/8/2014	Office Supplies	Europe	Russia	Offline	1779	651.21	52
3	514321792	6/20/2014	C	7/5/2014	Fruits	Sub-Saharan Africa	Sao Tome and Principe	Online	8102	9.33	
4	115456712	2/1/2013	L	2/6/2013	Office Supplies	Sub-Saharan Africa	Rwanda	Offline	5062	651.21	52

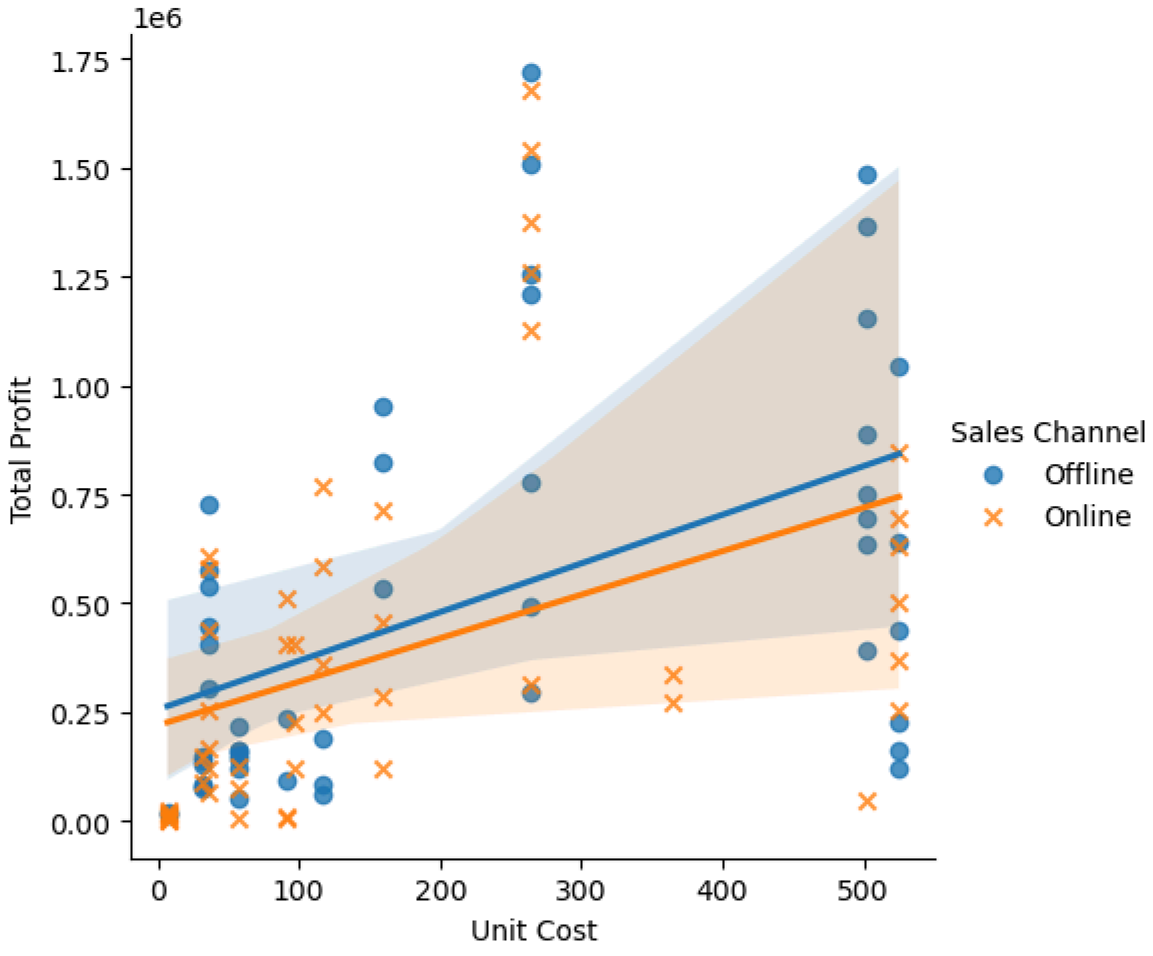
```
In [43]: data.plot(kind = 'bar', x = 'Unit Cost', y = 'Total Profit')
         plt.xticks(rotation = 90)
         plt.locator_params(axis='x',nbins=30)
         plt.locator_params(axis='y',nbins=30)
         plt.ylabel('Total Profit')
```

```
Out[43]: Text(0, 0.5, 'Total Profit')
```

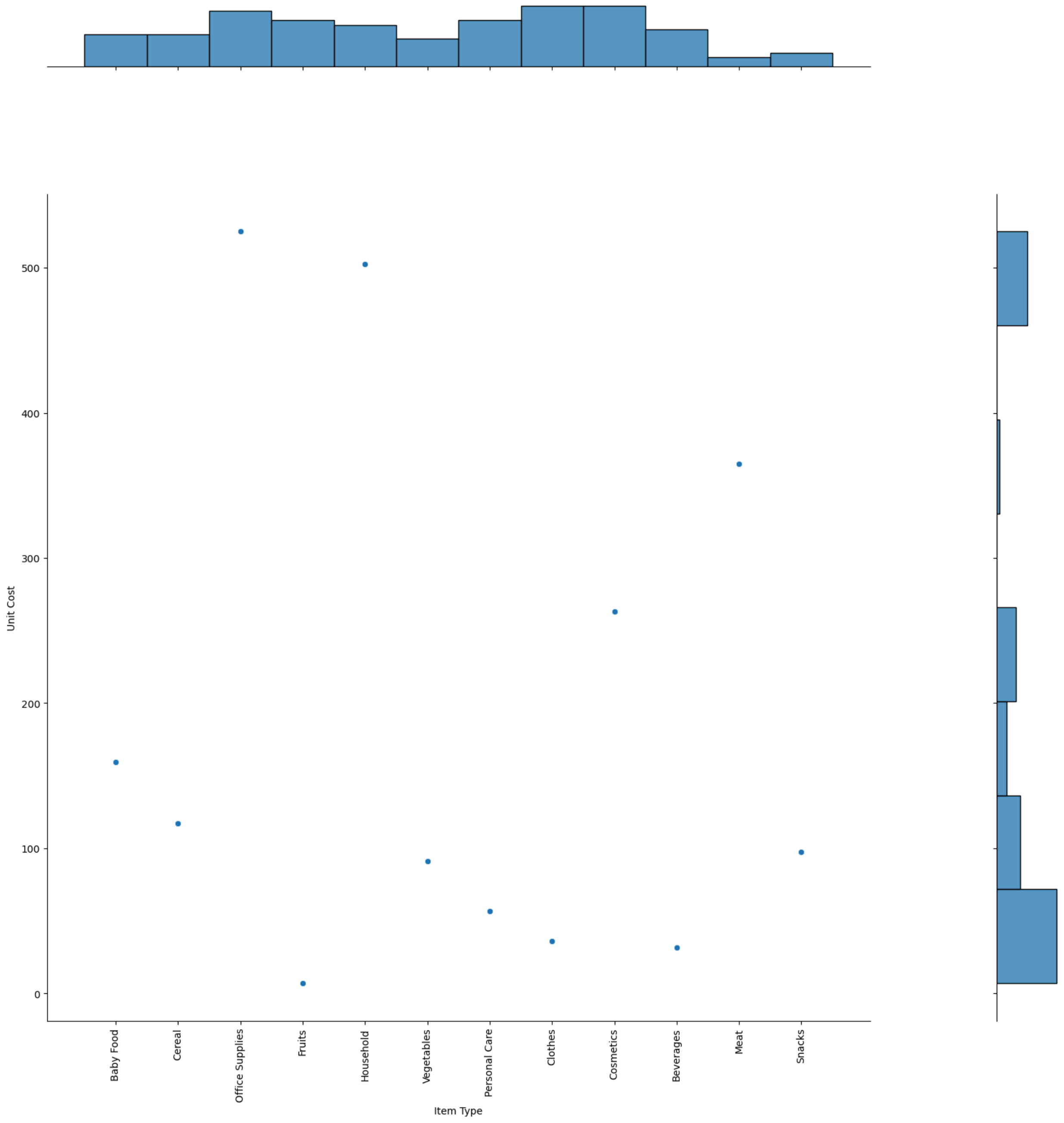


```
In [44]: sns.lmplot(x='Unit Cost',y='Total Profit',data=data,height=5,aspect=1,hue='Sales Chanr
         plt.show()
```

```
D:\Anaconda\Lib\site-packages\seaborn\axisgrid.py:118: UserWarning: The figure layout
has changed to tight
  self._figure.tight_layout(*args, **kwargs)
```



In [45]:
```
sns.jointplot(x='Item Type',y='Unit Cost',data=data,kind='scatter',height=15,ratio=5,c
plt.xticks(rotation=90)
plt.show()
```



country wise Analysis

In [46]:
```
data.head()
```

Out[46]:

	Order ID	Order Date	Order Priority	Ship Date	Item Type	Region	Country	Sales Channel	Units Sold	Unit Price	
0	669165933	5/28/2010	H	6/27/2010	Baby Food	Australia and Oceania	Tuvalu	Offline	9925	255.28	15
1	963881480	8/22/2012	C	9/15/2012	Cereal	Central America and the Caribbean	Grenada	Online	2804	205.70	11
2	341417157	5/2/2014	L	5/8/2014	Office Supplies	Europe	Russia	Offline	1779	651.21	52
3	514321792	6/20/2014	C	7/5/2014	Fruits	Sub-Saharan Africa	Sao Tome and Principe	Online	8102	9.33	
4	115456712	2/1/2013	L	2/6/2013	Office Supplies	Sub-Saharan Africa	Rwanda	Offline	5062	651.21	52

In [47]:
```
data['Country'].unique()
```

Out[47]:
```
array(['Tuvalu', 'Grenada', 'Russia', 'Sao Tome and Principe', 'Rwanda',
       'Solomon Islands', 'Angola', 'Burkina Faso',
       'Republic of the Congo', 'Senegal', 'Kyrgyzstan', 'Cape Verde',
       'Bangladesh', 'Honduras', 'Mongolia', 'Bulgaria', 'Sri Lanka',
       'Cameroon', 'Turkmenistan', 'East Timor', 'Norway', 'Portugal',
       'New Zealand', 'Moldova ', 'France', 'Kiribati', 'Mali',
       'The Gambia', 'Switzerland', 'South Sudan', 'Australia', 'Myanmar',
       'Djibouti', 'Costa Rica', 'Syria', 'Brunei', 'Niger', 'Azerbaijan',
       'Slovakia', 'Comoros', 'Iceland', 'Macedonia', 'Mauritania',
       'Albania', 'Lesotho', 'Saudi Arabia', 'Sierra Leone',
       "Cote d'Ivoire", 'Fiji', 'Austria', 'United Kingdom', 'San Marino',
       'Libya', 'Haiti', 'Gabon', 'Belize', 'Lithuania', 'Madagascar',
       'Democratic Republic of the Congo', 'Pakistan', 'Mexico',
       'Federated States of Micronesia', 'Laos', 'Monaco', 'Samoa ',
       'Spain', 'Lebanon', 'Iran', 'Zambia', 'Kenya', 'Kuwait',
       'Slovenia', 'Romania', 'Nicaragua', 'Malaysia', 'Mozambique'],
      dtype=object)
```

In [48]:
```
len(data['Country'].unique())
```

Out[48]:
```
76
```

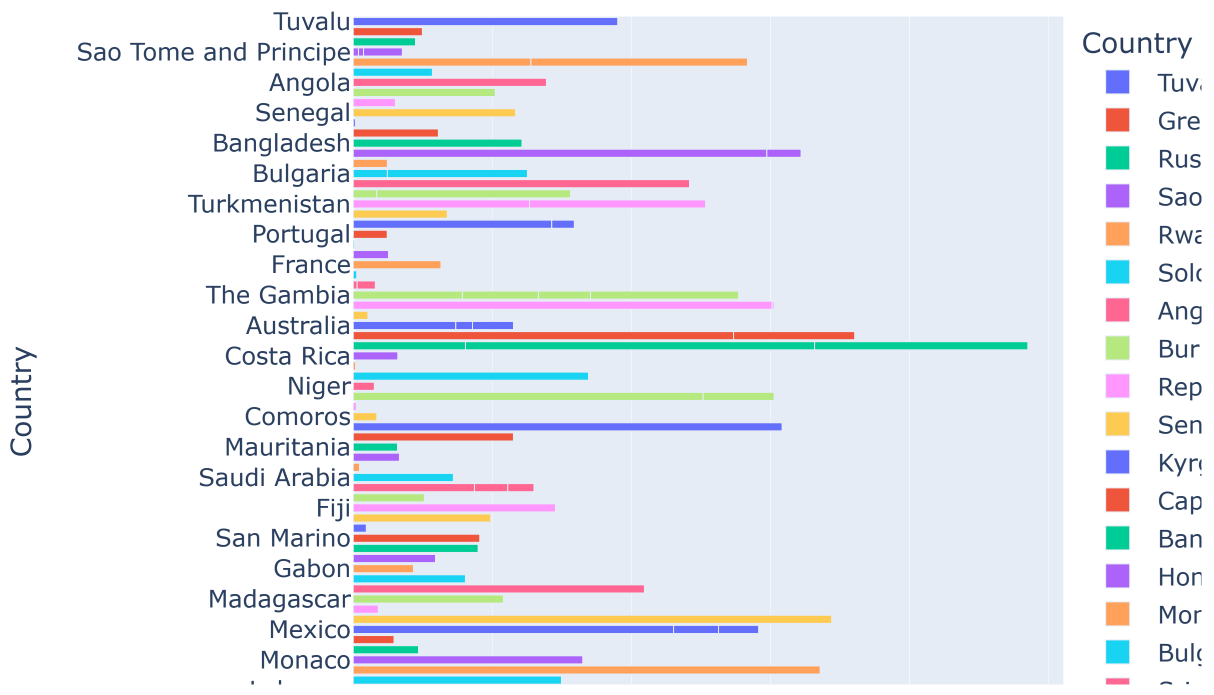
In [49]:
```
melt2 = data[['Country','Total Profit']]

melt2
```

Out[49]:

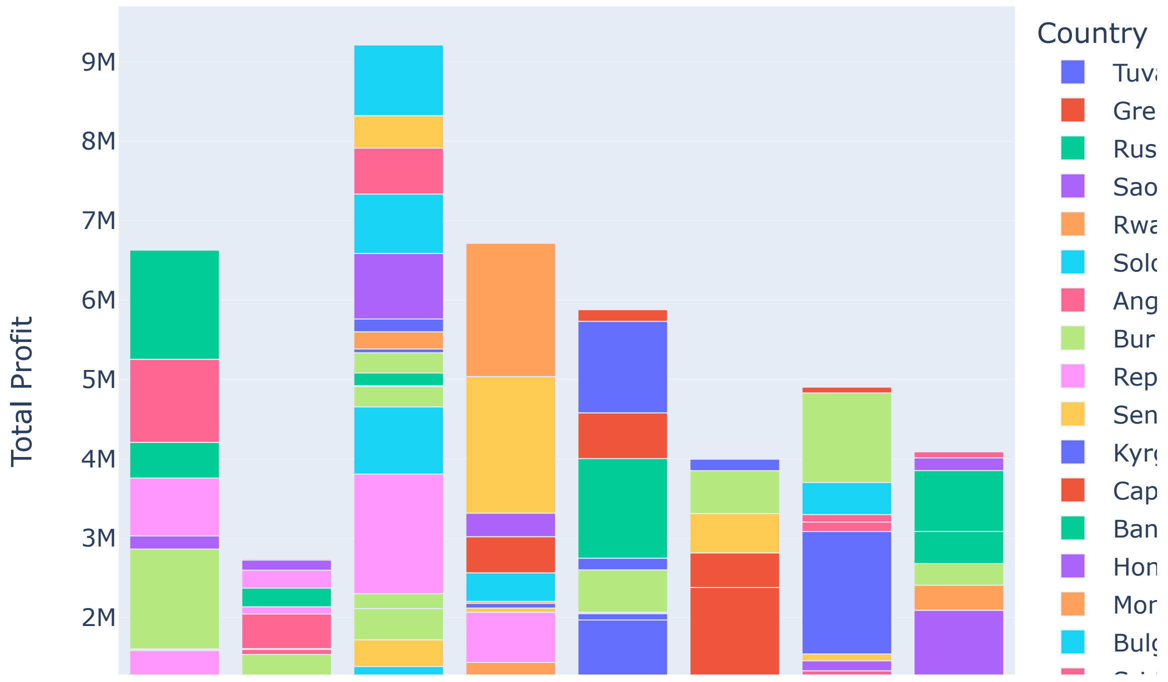
	Country	Total Profit
0	Tuvalu	951410.50
1	Grenada	248406.36
2	Russia	224598.75
3	Sao Tome and Principe	19525.82
4	Rwanda	639077.50
...	...	...
95	Mali	65214.72
96	Malaysia	15103.47
97	Sierra Leone	93748.05
98	Mexico	144521.02
99	Mozambique	889472.91

100 rows × 2 columns

In [50]:
```python
px.bar(data,x = 'Total Profit', y = 'Country', color = 'Country')
```



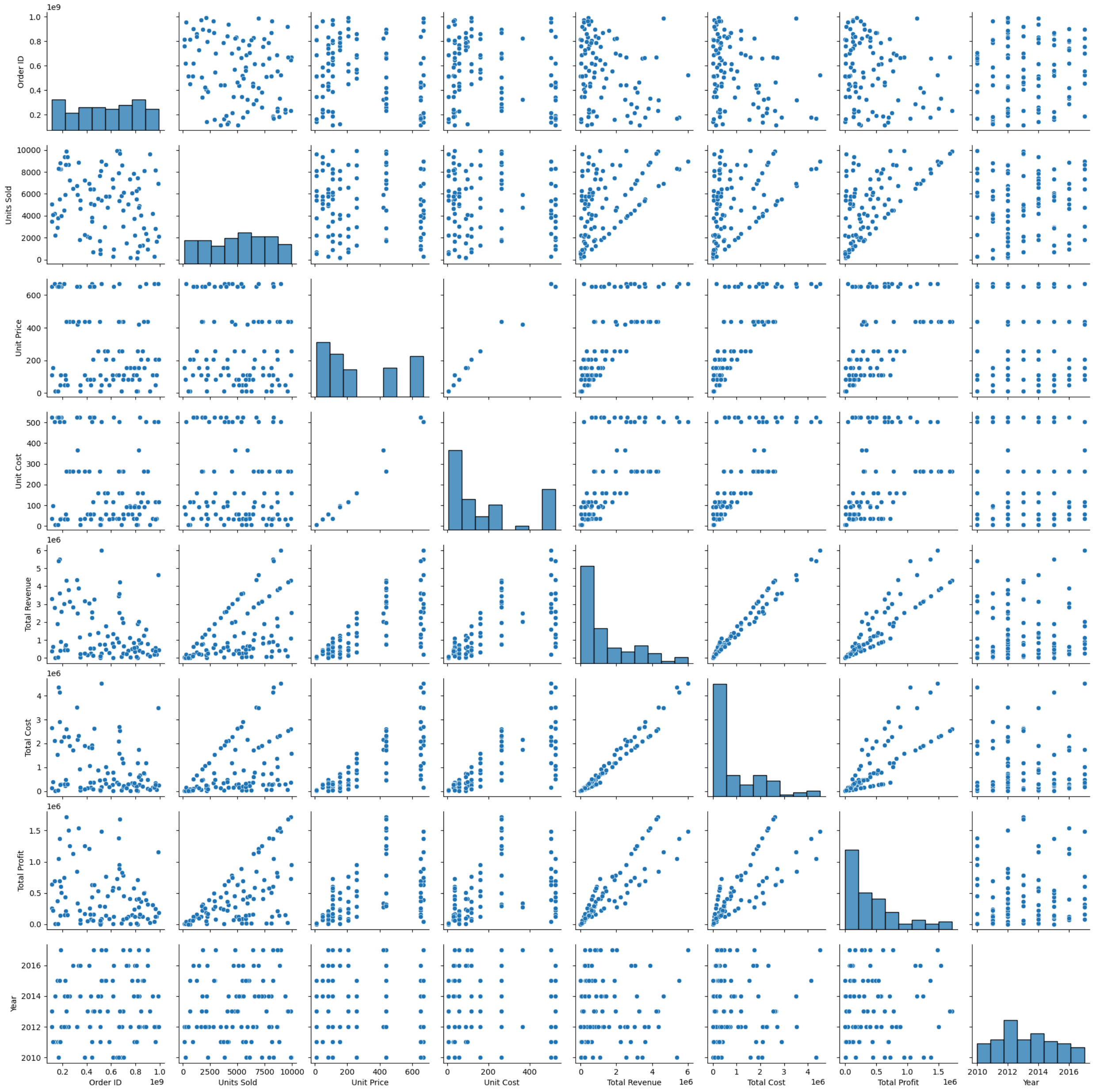
In [51]:
```
fig = px.bar(data,y = 'Total Profit',x = 'Year', color = 'Country')


fig
```



In [52]:
```
sns.pairplot(data)
```

```
D:\Anaconda\Lib\site-packages\seaborn\axisgrid.py:118: UserWarning:

The figure layout has changed to tight
```

Out[52]:
```
<seaborn.axisgrid.PairGrid at 0x299b74e0990>
```



In [53]:
```
data.to_csv('AmazomSalesData.csv')
```

In [ ]: