Business Sales Performance Analytics

Client Context

This analysis was conducted for a small online retail business selling consumer products across the UK and international markets.

The goal of the analysis is to:

- Understand sales performance over time
- Identify top-selling products
- Analyze regional revenue contribution
- Provide actionable business recommendations to improve revenue

In [1]:
```
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
import seaborn as sns

sns.set(style="whitegrid")
print("Environment ready")
```

```
Environment ready
```

In [6]:
```
df = pd.read_csv("online_retail.csv")
df.head()
```

Out[6]:

	InvoiceNo	StockCode	Description	Quantity	InvoiceDate	UnitPrice	CustomerI
0	536365	85123A	WHITE HANGING HEART T-LIGHT HOLDER	6	2010-12-01 08:26:00	2.55	17850.
1	536365	71053	WHITE METAL LANTERN	6	2010-12-01 08:26:00	3.39	17850.
2	536365	84406B	CREAM CUPID HEARTS COAT HANGER	8	2010-12-01 08:26:00	2.75	17850.
3	536365	84029G	KNITTED UNION FLAG HOT WATER BOTTLE	6	2010-12-01 08:26:00	3.39	17850.
4	536365	84029E	RED WOOLLY HOTTIE WHITE HEART.	6	2010-12-01 08:26:00	3.39	17850.

In [13]:
```
df.info()
df.describe()
df.isna().sum()
```

```
<class 'pandas.core.frame.DataFrame'>
Index: 530104 entries, 0 to 541908
Data columns (total 9 columns):
 #   Column       Non-Null Count   Dtype
---  ------       --------------   -----
 0   InvoiceNo    530104 non-null  object
 1   StockCode    530104 non-null  object
 2   Description  530104 non-null  object
 3   Quantity     530104 non-null  int64
 4   InvoiceDate  530104 non-null  datetime64[ns]
 5   UnitPrice    530104 non-null  float64
 6   CustomerID   397884 non-null  float64
 7   Country      530104 non-null  object
 8   CustomeerID  530104 non-null  float64
dtypes: datetime64[ns](1), float64(3), int64(1), object(4)
memory usage: 40.4+ MB
```

Out[13]:

```
InvoiceNo          0
StockCode          0
Description        0
Quantity           0
InvoiceDate        0
UnitPrice          0
CustomerID     132220
Country            0
CustomeerID        0
dtype: int64
```

In [14]:
```
df['InvoiceDate'] = pd.to_datetime(df['InvoiceDate'])
df = df[~df['InvoiceNo'].str.startswith('C', na=False)]
df = df[df['Quantity'] > 0]
df = df[df['UnitPrice'] > 0]
df.shape
```

Out[14]:
```
(530104, 9)
```

In [18]:
```
df = df.dropna(subset=['Description'])
df['CustomerID'] = df['CustomerID'].fillna(0)
df.isna().sum()
```

Out[18]:
```
InvoiceNo      0
StockCode      0
Description    0
Quantity       0
InvoiceDate    0
UnitPrice      0
CustomerID     0
Country        0
CustomeerID    0
dtype: int64
```

In [19]:
```
df['Revenue'] = df['Quantity'] * df['UnitPrice']
df[['Quantity', 'UnitPrice', 'Revenue']].head()
```

Out[19]:

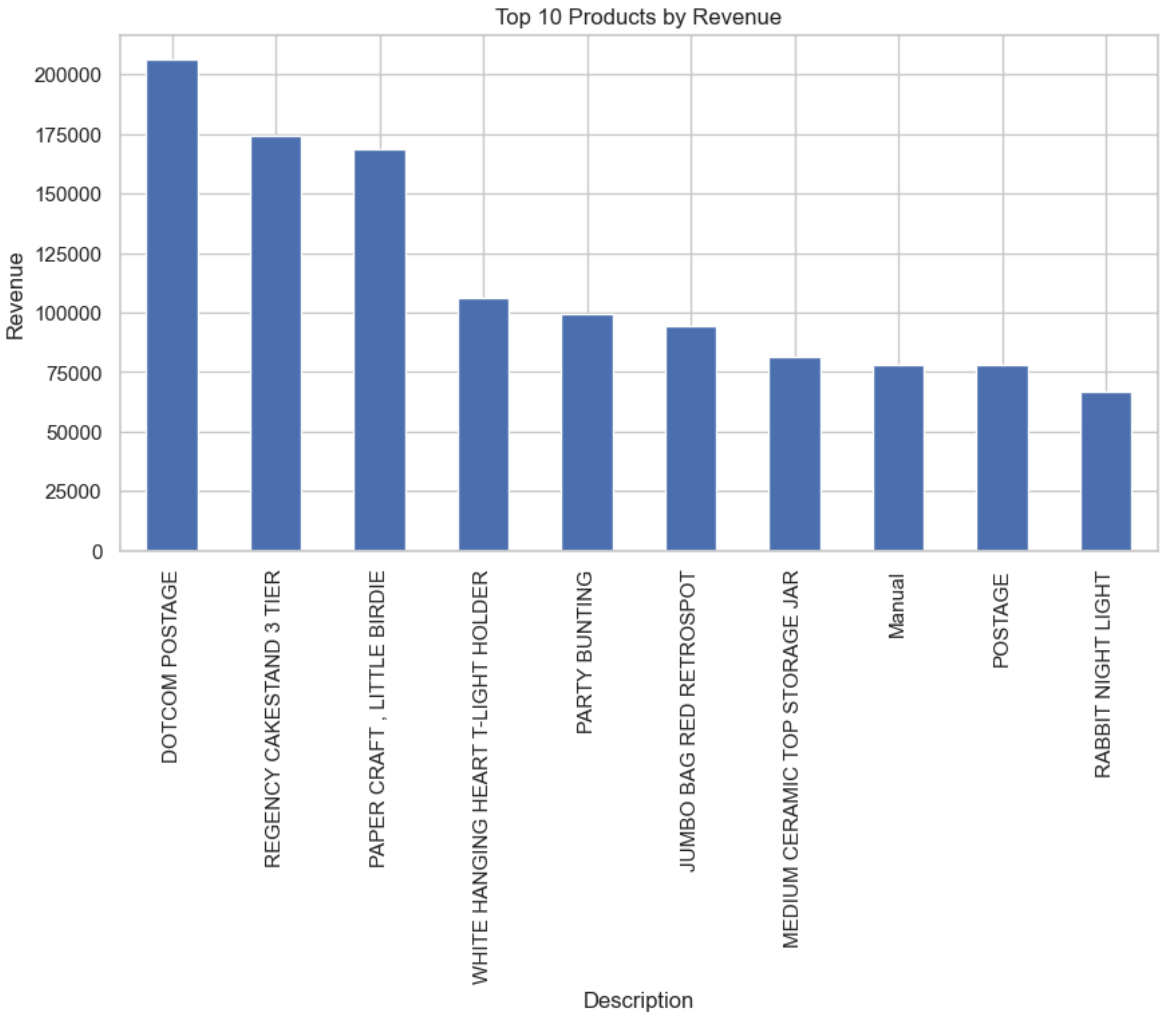
	Quantity	UnitPrice	Revenue
0	6	2.55	15.30
1	6	3.39	20.34
2	8	2.75	22.00
3	6	3.39	20.34
4	6	3.39	20.34

In [22]:
```
monthly_revenue = (
    df
    .set_index('InvoiceDate')
    .resample('ME')['Revenue']
    .sum()
)

plt.figure(figsize=(10,5))
monthly_revenue.plot()
plt.title("Monthly Revenue Trend")
plt.xlabel("Month")
plt.ylabel("Revenue")
plt.show()
```

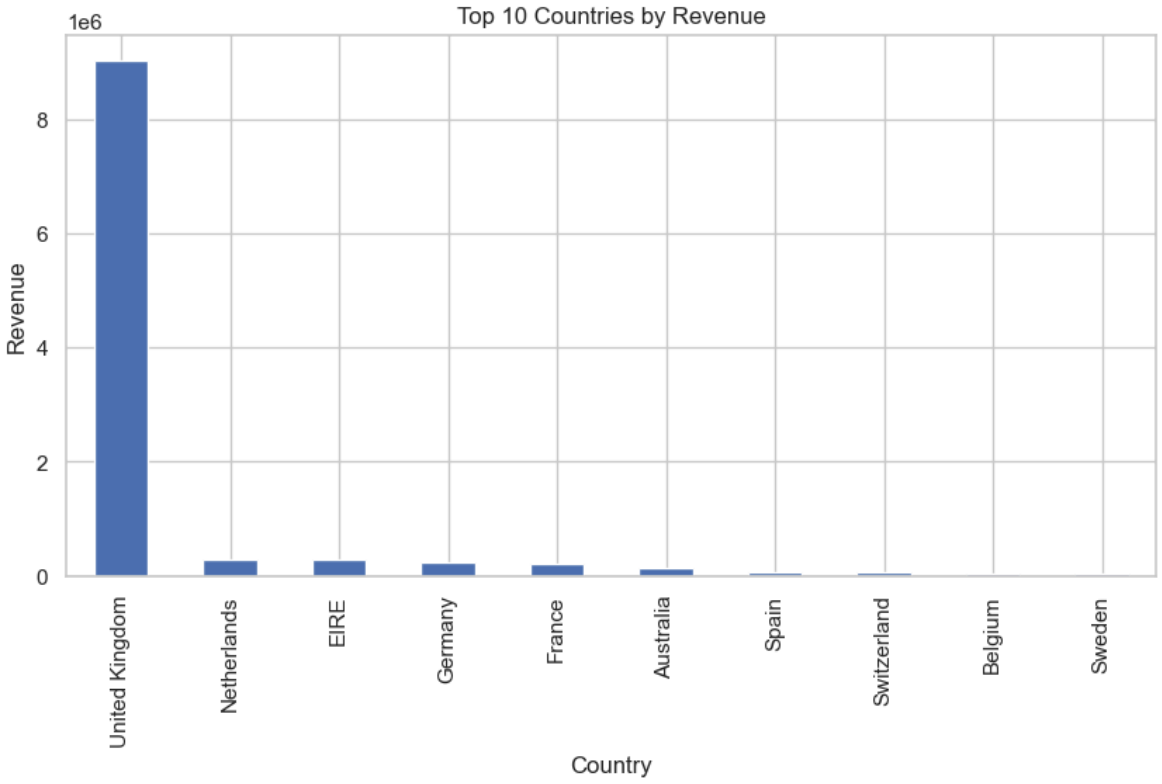
In [23]:
```
top_products = (
    df.groupby('Description')['Revenue']
    .sum()
    .sort_values(ascending=False)
    .head(10)
)

plt.figure(figsize=(10,5))
top_products.plot(kind='bar')
plt.title("Top 10 Products by Revenue")
plt.ylabel("Revenue")
plt.show()
```



In [25]:
```
country_sales = (
    df.groupby('Country')['Revenue']
    .sum()
    .sort_values(ascending=False)
    .head(10)
)

plt.figure(figsize=(10,5))
country_sales.plot(kind='bar')
plt.title("Top 10 Countries by Revenue")
plt.ylabel("Revenue")
plt.show()
```



In [27]:
```
top_customers = (
    df[df['CustomerID'] !=0]
    .groupby('CustomerID')['Revenue']
    .sum()
    .sort_values(ascending=False)
    .head(10)
)

top_customers
```

Out[27]:
```
CustomerID
14646.0    280206.02
18102.0    259657.30
17450.0    194550.79
16446.0    168472.50
14911.0    143825.06
12415.0    124914.53
14156.0    117379.63
17511.0     91062.38
16029.0     81024.84
12346.0     77183.60
Name: Revenue, dtype: float64
```

Dashboard Summary

This dashboard provides a high-level overview of the business's sales performance, highlighting key revenue trends, top-performing products, and regional contributions.

The insights generated can be used by business stakeholders to:

- Make data-driven inventory decisions
- Plan targeted marketing campaigns

- Identify high-value customers and regions

Key Business Insights

1. Revenue shows strong seasonal patterns with peaks toward the end of the year, indicating higher demand during festive periods.
2. A small group of products contributes a large share of total revenue, suggesting a Pareto (80/20) effect.
3. The UK dominates overall revenue, but several international markets show strong growth potential.
4. High-value customers generate a significant portion of sales, making them ideal targets for loyalty programs.

Business Recommendations

- Focus marketing and inventory planning on top-performing products.
- Introduce customer loyalty or membership programs for high-value customers.
- Expand logistics and promotions in high-performing non-UK regions.
- Plan seasonal campaigns to maximize revenue during peak months.