Walmart Sales Analysis:

A. Analyze the performance of sales and revenue at the city and branch level

In [3]:
```
# Importing libraries for data manipulation and analysis
import pandas as pd
import numpy as np
import seaborn as sns
import matplotlib.pyplot as plt
```

In [4]:
```
# URL of the Excel file
url= 'WalmartSales.xlsx'
# Read the Excel file into a pandas DataFrame
walmart = pd.read_excel(url)
```

In [35]:
```
# Display the first few rows of the DataFrame
walmart.head()
```

Out[35]:

	Invoice ID	Branch	City	Customer type	Gender	Product line	Unit price	Quantity	Date	Time	Payment	Rating	Total Revenue	
0	750-67-8428	A	Yangon	Member	Female	Health and beauty	74.69	7	2019-01-05	13:08:00	Ewallet	9.1	522.83	.
1	226-31-3081	A	Naypyitaw	Normal	Female	Electronic accessories	15.28	5	2019-03-08	10:29:00	Cash	9.6	76.40	
2	631-41-3108	A	Yangon	Normal	Male	Home and lifestyle	46.33	7	2019-03-03	13:23:00	Credit card	7.4	324.31	
3	123-19-1176	B	Yangon	Member	Male	Health and beauty	58.22	8	2019-01-27	20:33:00	Ewallet	8.4	465.76	.
4	373-73-7910	C	Yangon	Normal	Male	Sports and travel	86.31	7	2019-02-08	10:37:00	Ewallet	5.3	604.17	F

CITY WISE SALES

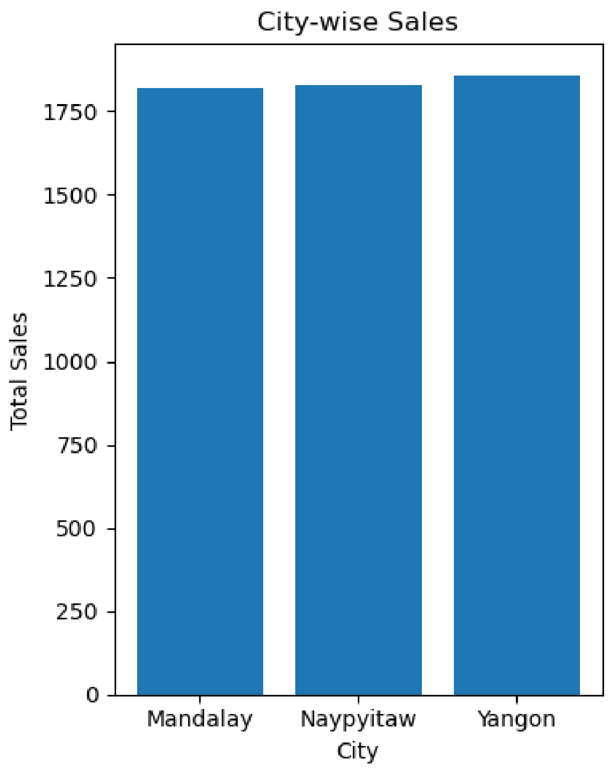
In [6]:
```
# Grouping the Walmart DataFrame by 'City' and calculating the sum of 'Quantity' for each city
city_wise_sales = walmart.groupby('City')['Quantity'].sum().reset_index()

# Renaming the column representing total sales ('Quantity') to 'Total Sales'
city_wise_sales = city_wise_sales.rename(columns={'Quantity': 'Total Sales'})
```

In [7]:
```
# Displaying the DataFrame city_wise_sales
city_wise_sales
```

Out[7]:

	City	Total Sales
0	Mandalay	1820
1	Naypyitaw	1831
2	Yangon	1859

In [8]:
```
# Creating the bar plot using matplotlib
plt.figure(figsize=(4, 5))
plt.bar(city_wise_sales['City'], city_wise_sales['Total Sales'])
plt.title('City-wise Sales')
plt.xlabel('City')
plt.ylabel('Total Sales')
plt.tight_layout()
plt.show()
```



Yangon has the highest total sales at 1859 units, followed closely by Naypyitaw at 1831 units, while Mandalay has the lowest total sales at 1820 units.

BRANCH WISE SALE

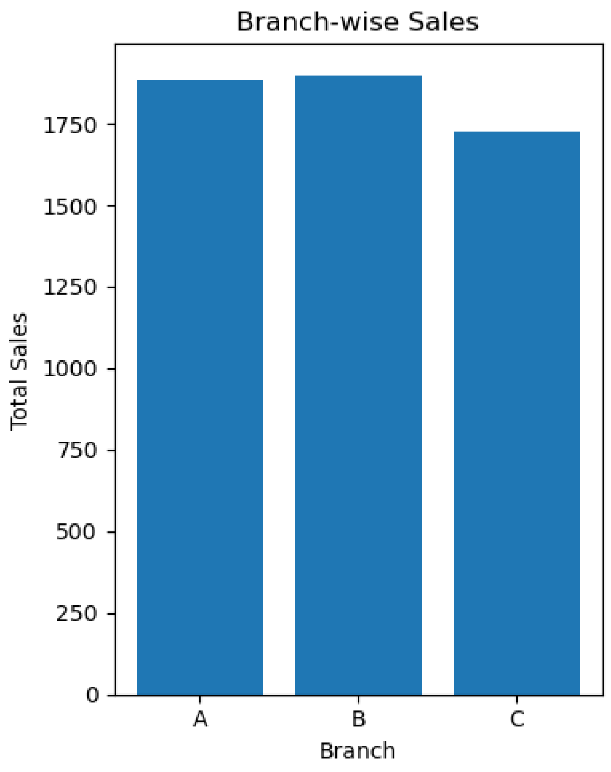
In [9]:
```
# Grouping the Walmart data by 'Branch' and calculating the total quantity sold in each branch
branch_wise_sales = walmart.groupby('Branch')['Quantity'].sum().reset_index()

# Renaming the column representing total sales ('Quantity') to 'Total Sales'
branch_wise_sales = branch_wise_sales.rename(columns={'Quantity': 'Total Sales'})
```

In [10]:
```
# Displaying the DataFrame branch_wise_sales
branch_wise_sales
```

Out[10]:

	Branch	Total Sales
0	A	1883
1	B	1899
2	C	1728

In [11]:
```
# Creating the bar plot using matplotlib
plt.figure(figsize=(4,5))
plt.bar(branch_wise_sales['Branch'], branch_wise_sales['Total Sales'])
plt.title('Branch-wise Sales')
plt.xlabel('Branch')
plt.ylabel('Total Sales')
plt.tight_layout()
plt.show()
```



Branch B leads with the highest total sales of 1899 units, followed by branch A with 1883 units. Branch C shows the lowest total sales at 1728 units.

BRANCH AND CITY WISE SALES

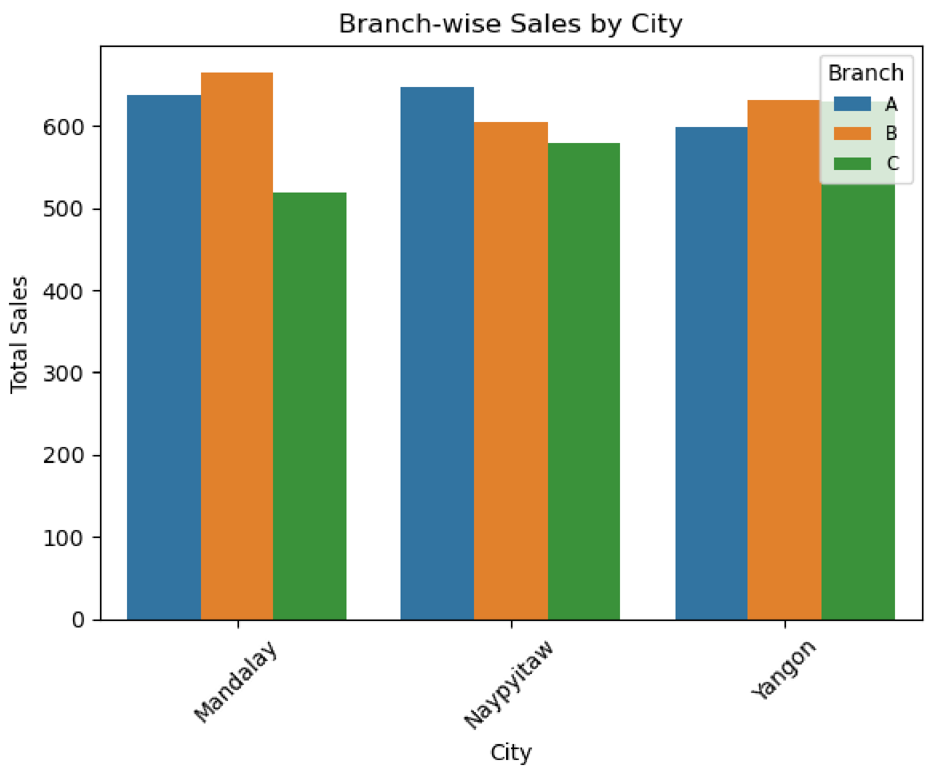
In [12]:
```
# Grouping the Walmart data by both 'City' and 'Branch' and calculating the total quantity sold in eac
branch_and_city_wise_sale= walmart.groupby(['City', 'Branch'])['Quantity'].sum().reset_index()
```

In [13]:
```
# Displaying the DataFrame branch_and_city_wise_sale
branch_and_city_wise_sale
```

Out[13]:

	City	Branch	Quantity
0	Mandalay	A	637
1	Mandalay	B	664
2	Mandalay	C	519
3	Naypyitaw	A	648
4	Naypyitaw	B	604
5	Naypyitaw	C	579
6	Yangon	A	598
7	Yangon	B	631
8	Yangon	C	630

In [14]:
```
# Creating the bar plot using matplotlib
plt.figure(figsize=(6, 5))
sns.barplot(x='City', y='Quantity', hue='Branch', data=branch_and_city_wise_sale)
plt.title('Branch-wise Sales by City')
plt.xlabel('City')
plt.ylabel('Total Sales')
plt.xticks(rotation=45)
plt.legend(title='Branch', fontsize='small')
plt.tight_layout()
plt.show()
```



Branch B generally has the highest sales in Mandalay and Yangon, while branch A leads in Naypyitaw.

CITY WISE REVENUE

In [15]:
```
# Calculating the total revenue.
walmart['Total Revenue'] = walmart['Unit price'] * walmart['Quantity']
```

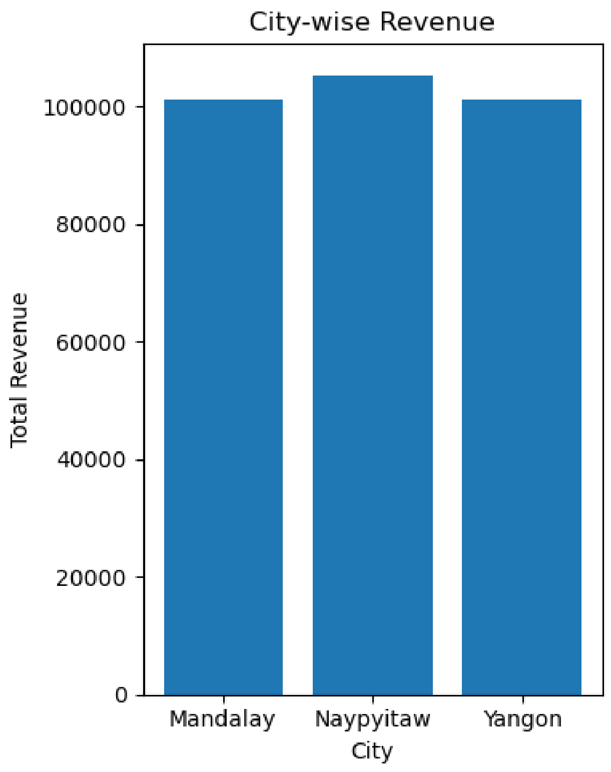
In [16]:
```
# Group the data by 'City' and sum up the total revenue for each city
city_wise_revenue = walmart.groupby('City')['Total Revenue'].sum().reset_index()
```

In [17]:
```
# Display the city-wise revenue
city_wise_revenue
```

Out[17]:

	City	Total Revenue
0	Mandalay	101140.64
1	Naypyitaw	105303.53
2	Yangon	101143.21

In [33]:
```
# Create the bar plot using matplotlib
plt.figure(figsize=(4,5))
plt.bar(city_wise_revenue['City'], city_wise_revenue['Total Revenue'])
plt.title('City-wise Revenue')
plt.xlabel('City')
plt.ylabel('Total Revenue')
plt.tight_layout()
plt.show()
```



Naypyitaw leads with the highest total revenue, followed closely by Mandalay, and Yangon.

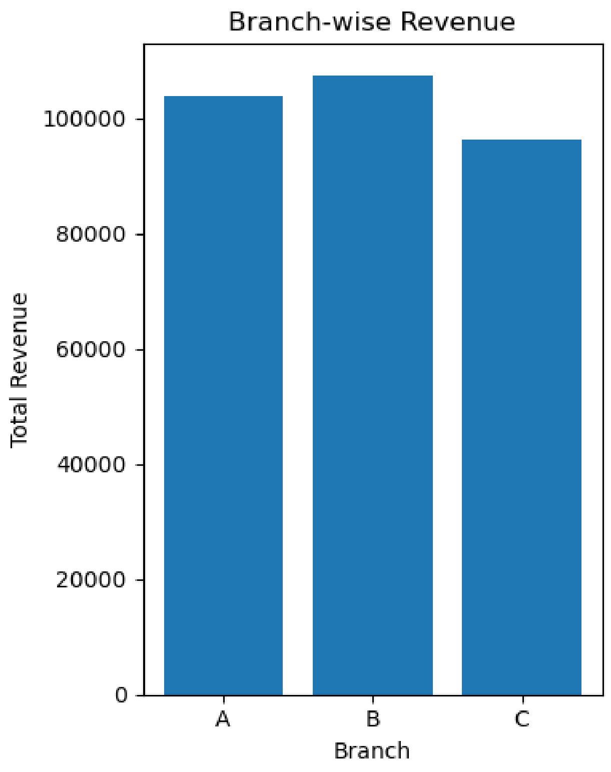
BRANCH WISE REVENUE

In [19]:
```
# Calculating the total revenue for each branch
branch_wise_revenue = walmart.groupby('Branch')['Total Revenue'].sum().reset_index()
# Displaying the branch wise revenue
branch_wise_revenue
```

Out[19]:

	Branch	Total Revenue
0	A	103763.00
1	B	107567.19
2	C	96257.19

In [20]:
```
# Create the bar plot using Matplotlib
plt.figure(figsize=(4,5))
plt.bar(branch_wise_revenue['Branch'], branch_wise_revenue['Total Revenue'])
plt.title('Branch-wise Revenue')
plt.xlabel('Branch')
plt.ylabel('Total Revenue')
plt.tight_layout()
plt.show()
```



Branch B has the highest revenue, followed by branch A and branch C.

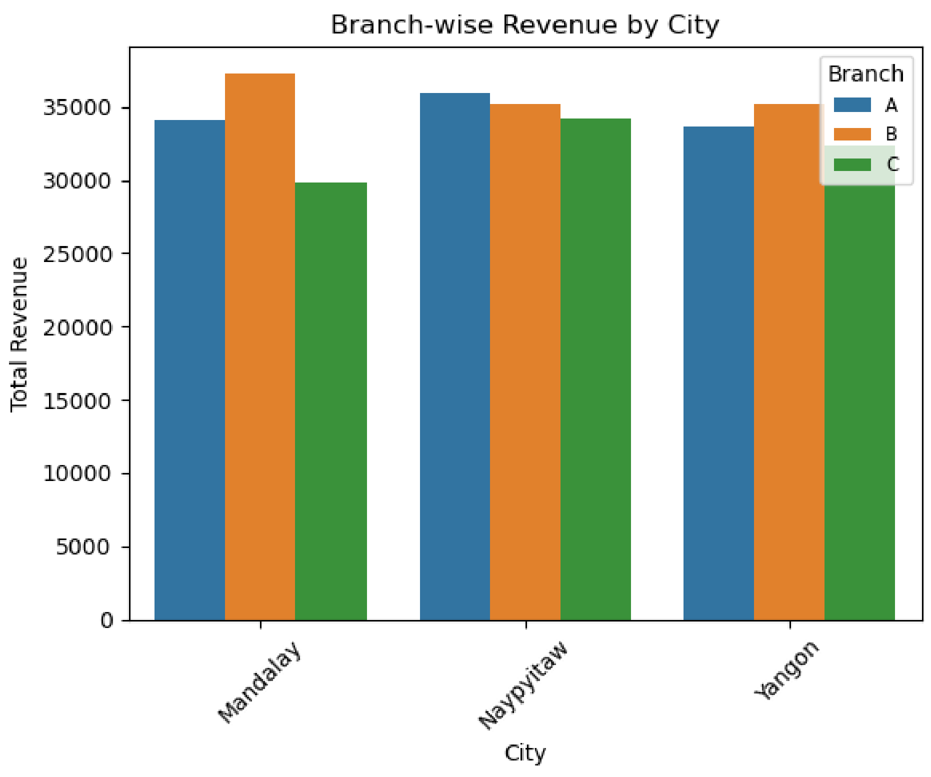
CITY AND BRANCH WISE REVENUE

In [21]:
```
# Grouping the Walmart data by both 'City' and 'Branch' and calculating the total revenue for each ci
branch_and_city_wise_revenue= walmart.groupby(['City', 'Branch'])['Total Revenue'].sum().reset_index(
# Displaying the branch and city wise revenue
branch_and_city_wise_revenue
```

Out[21]:

	City	Branch	Total Revenue
0	Mandalay	A	34130.09
1	Mandalay	B	37215.93
2	Mandalay	C	29794.62
3	Naypyitaw	A	35985.64
4	Naypyitaw	B	35157.75
5	Naypyitaw	C	34160.14
6	Yangon	A	33647.27
7	Yangon	B	35193.51
8	Yangon	C	32302.43

In [22]:
```
# Creating the bar plot using matplotlib
plt.figure(figsize=(6, 5))
sns.barplot(x='City', y='Total Revenue', hue='Branch', data=branch_and_city_wise_revenue)
plt.title('Branch-wise Revenue by City')
plt.xlabel('City')
plt.ylabel('Total Revenue')
plt.xticks(rotation=45)
plt.legend(title='Branch', fontsize='small')
plt.tight_layout()
plt.show()
```



Branch B generally leads in revenue across all cities, followed by branch A in Mandalay and Naypyitaw, while in Yangon, branch B leads followed by branch A.

B. What is the average price of an item sold at each branch of the city

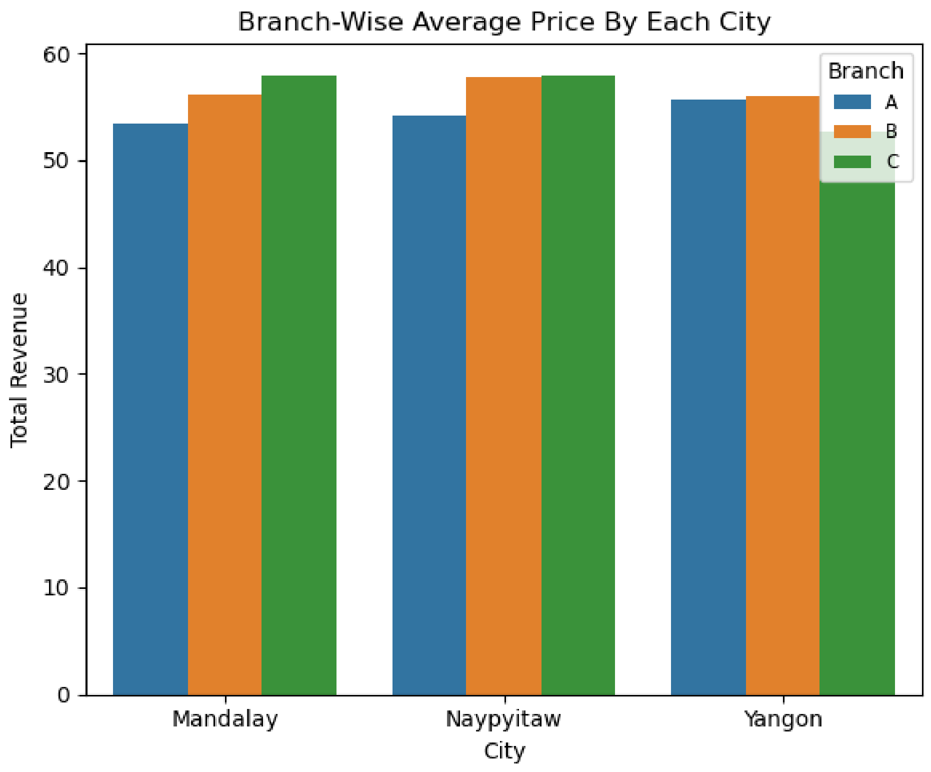
In [34]:
```
# Grouping the data by both 'City' and 'Branch' and calculating the average price of an item sold
average_price_per_branch_city = walmart.groupby(['City', 'Branch'])['Unit price'].mean().reset_index(
```

In [25]:
```
# Displayng average price per branch of the city
average_price_per_branch_city
```

Out[25]:

	City	Branch	Unit price
0	Mandalay	A	53.353866
1	Mandalay	B	56.133305
2	Mandalay	C	57.958316
3	Naypyitaw	A	54.123182
4	Naypyitaw	B	57.785688
5	Naypyitaw	C	57.941009
6	Yangon	A	55.639298
7	Yangon	B	56.011062
8	Yangon	C	52.684602

In [62]:
```
plt.figure(figsize=(6, 5))
sns.barplot(x='City', y='Unit price', hue='Branch', data=average_price_per_branch_city)
plt.title('Branch-Wise Average Price By Each City')
plt.xlabel('City')
plt.ylabel('Total Revenue')
plt.legend(title='Branch', fontsize='small')
plt.tight_layout()
plt.show()
```



Branch C in Mandalay has the highest unit price, followed by branch C in Naypyitaw, and branch A in Yangon.

C. Analyze the performance of sales and revenue, Month over Month across the Product line, Gender, and Payment Method, and identify the focus areas to get better sales for April 2019.

In [27]:
```
walmart.head(5)
```

Out[27]:

	Invoice ID	Branch	City	Customer type	Gender	Product line	Unit price	Quantity	Date	Time	Payment	Rating	Tota Revenu
0	750-67-8428	A	Yangon	Member	Female	Health and beauty	74.69	7	1/5/2019	13:08:00	Ewallet	9.1	522.8
1	226-31-3081	A	Naypyitaw	Normal	Female	Electronic accessories	15.28	5	3/8/2019	10:29:00	Cash	9.6	76.4
2	631-41-3108	A	Yangon	Normal	Male	Home and lifestyle	46.33	7	3/3/2019	13:23:00	Credit card	7.4	324.3
3	123-19-1176	B	Yangon	Member	Male	Health and beauty	58.22	8	1/27/2019	20:33:00	Ewallet	8.4	465.7
4	373-73-7910	C	Yangon	Normal	Male	Sports and travel	86.31	7	2/8/2019	10:37:00	Ewallet	5.3	604.1

In [28]:
```
# Extract Month and year from 'Date' column
walmart['Date'] = pd.to_datetime(walmart['Date'])
walmart['Month'] = walmart['Date'].dt.strftime('%B')
walmart['Month']
```

Out[28]:
```
0       January
1         March
2         March
3       January
4      February
         ...
995     January
996       March
997    February
998    February
999    February
Name: Month, Length: 1000, dtype: object
```

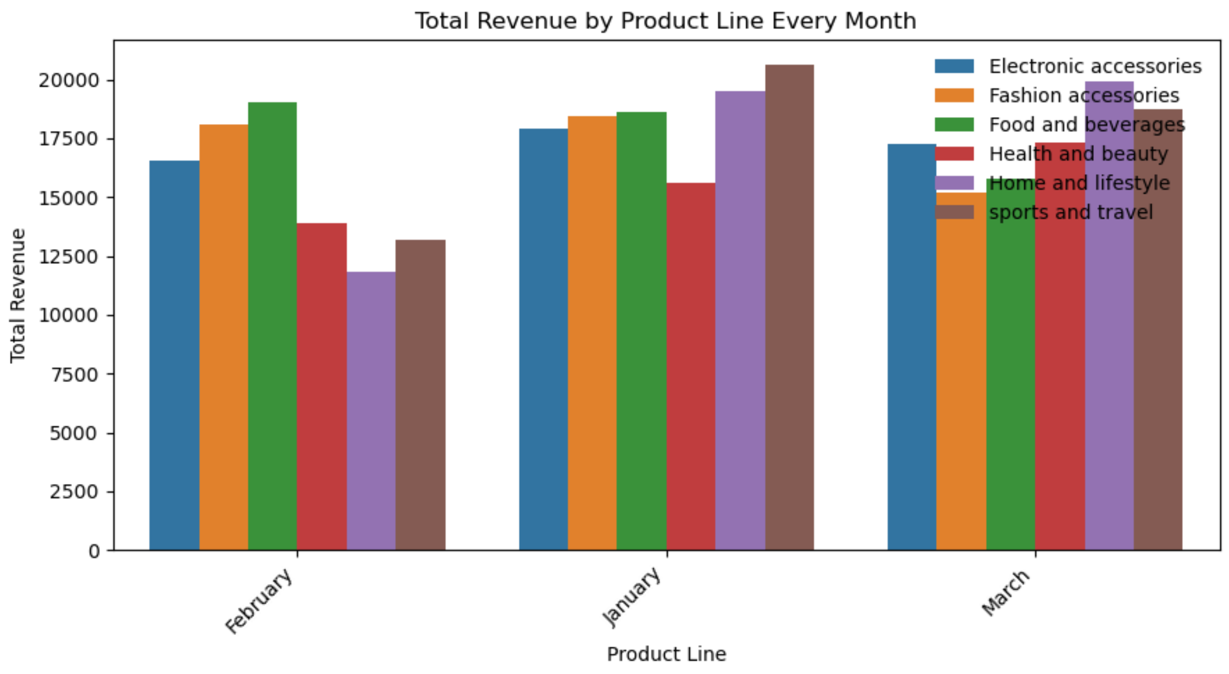
PRODUCT LINE WISE ANALYSIS

In [69]:
```
product_line= walmart.groupby(['Product line', 'Month']).agg({'Quantity': 'sum', 'Total Revenue': 'su
product_line
```

Out[69]:

	Product line	Month	Quantity	Total Revenue
0	Electronic accessories	February	313	16536.10
1	Electronic accessories	January	333	17934.56
2	Electronic accessories	March	325	17279.37
3	Fashion accessories	February	295	18104.63
4	Fashion accessories	January	336	18423.92
5	Fashion accessories	March	271	15191.35
6	Food and beverages	February	349	19047.96
7	Food and beverages	January	325	18638.60
8	Food and beverages	March	278	15784.72
9	Health and beauty	February	266	13906.91
10	Health and beauty	January	254	15603.02
11	Health and beauty	March	334	17341.25
12	Home and lifestyle	February	205	11842.27
13	Home and lifestyle	January	342	19518.80
14	Home and lifestyle	March	364	19935.99
15	Sports and travel	February	226	13152.01
16	Sports and travel	January	375	20635.26
17	Sports and travel	March	319	18710.66

In [67]:
```
# Creating a bar plot
plt.figure(figsize=(9, 5))
sns.barplot(data=product_line, x='Month', y='Total Revenue', hue='Product line', errorbar=None)
plt.title('Total Revenue by Product Line Every Month')
plt.xlabel('Product Line')
plt.ylabel('Total Revenue')
plt.xticks(rotation=45, ha='right')
plt.legend(title='Product line', fontsize='small')
plt.legend(['Electronic accessories', 'Fashion accessories','Food and beverages', 'Health and beauty'
plt.tight_layout()
plt.show()
```



In January, 375 units of Sports and travel products were sold, generating a total revenue of $20,635.26.

GENDER WISE ANALYSIS

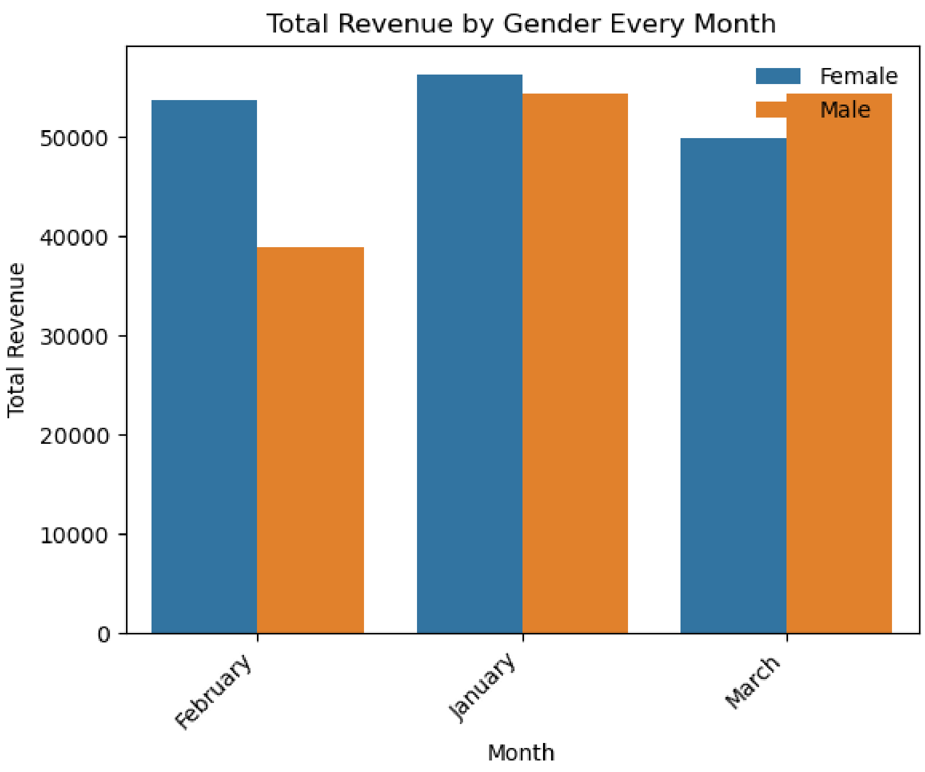
In [38]:
```
Gender_wise= walmart.groupby(['Gender', 'Month']).agg({'Quantity': 'sum', 'Total Revenue': 'sum'}).re
```

In [39]:
```
Gender_wise
```

Out[39]:

	Gender	Month	Quantity	Total Revenue
0	Female	February	951	53652.91
1	Female	January	1019	56322.84
2	Female	March	899	49912.75
3	Male	February	703	38936.97
4	Male	January	946	54431.32
5	Male	March	992	54330.59

In [55]:
```
plt.figure(figsize=(6, 5))
sns.barplot(data=Gender_wise, x='Month', y='Total Revenue', hue='Gender', errorbar=None)
plt.title('Total Revenue by Gender Every Month')
plt.xlabel('Month')
plt.ylabel('Total Revenue')
plt.xticks(rotation=45, ha='right')
plt.legend(['Female','Male'], frameon=False, loc='upper right')
plt.tight_layout()
plt.show()
```



The highest total revenue is generated by females in January, with a total revenue of $56,322.84.

PAYMENT METHOD WISE ANALYSIS

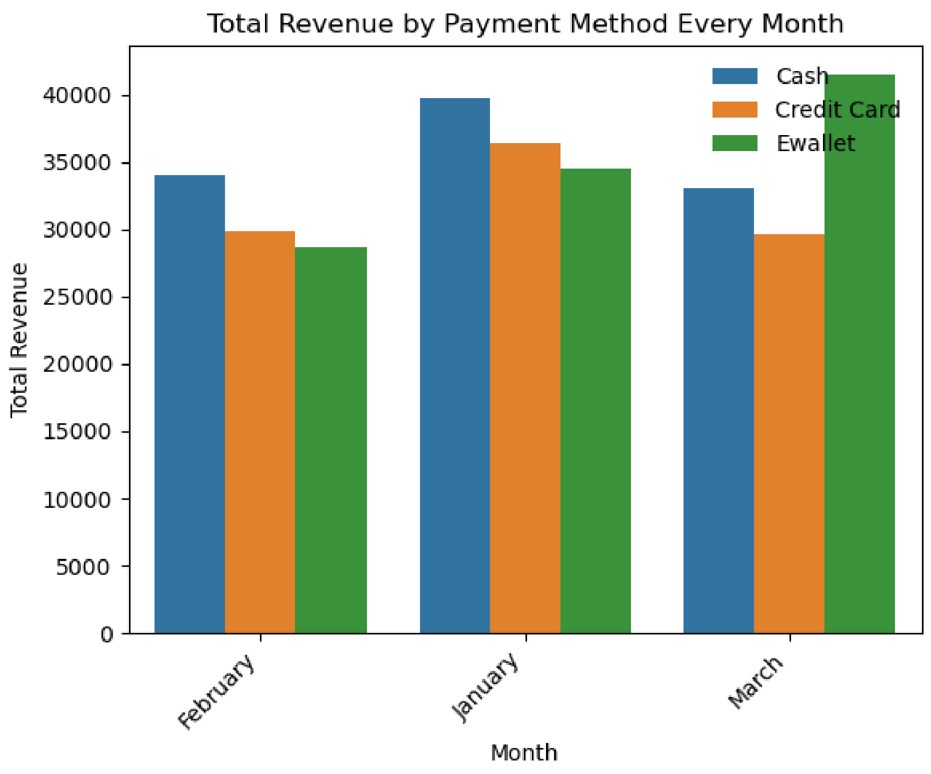
In [41]:
```
Payment_method= walmart.groupby(['Payment', 'Month']).agg({'Quantity': 'sum', 'Total Revenue': 'sum'}
```

In [42]:
```
Payment_method
```

Out[42]:

	Payment	Month	Quantity	Total Revenue
0	Cash	February	596	34044.13
1	Cash	January	708	39781.03
2	Cash	March	592	33038.24
3	Credit card	February	505	29866.69
4	Credit card	January	622	36425.31
5	Credit card	March	595	29676.64
6	Ewallet	February	553	28679.06
7	Ewallet	January	635	34547.82
8	Ewallet	March	704	41528.46

In [56]:
```python
plt.figure(figsize=(6, 5))
sns.barplot(data=Payment_method, x='Month', y='Total Revenue', hue='Payment', errorbar=None)
plt.title('Total Revenue by Payment Method Every Month')
plt.xlabel('Month')
plt.ylabel('Total Revenue')
plt.xticks(rotation=45, ha='right')
plt.legend(['Cash','Credit Card','Ewallet'], frameon=False, loc='upper right')
plt.tight_layout()
plt.show()
```



The highest total revenue is generated through Ewallet payments in March, totaling $41,528.46.

The lowest total revenue is generated through Credit card payments in February, totaling $29,866.69.

FOCUS AREAS TO IMPROVE SALES FOR APRIL 2019

FASHION ACCESSORIES AND FOOD & BEVERAGES: Focus on marketing strategies or promotions to boost sales in April.

MALE CUSTOMERS: Implement targeted marketing campaigns to attract male customers in April.

CASH AND CREDIT CARD PAYMENTS: Consider offering discounts or incentives for customers using these payment methods to increase sales in April.

2. APP EXPLORATION:

LIMITED INVESTMENT OPTIONS: Adding more investment choices to the Jar app would make it more attractive and useful for users. Right now, the app mainly lets you invest in digital gold, which is a cool idea. But if it also offered things like mutual funds, stocks, or bonds, more people might be interested.

JAR PRIORITIZES TRANSACTIONS, BUT USERS NEED EDUCATION! Include resources like:

- Investment tutorials: Explain key concepts, risks, and strategies.
- Interactive risk calculators: Help users assess their risk tolerance.
- Goal-setting guides: Assist users in defining financial goals and choosing investments.

3. PRODUCT OPTIMIZATION:

The Jar app has an engagement feature called 'Spin to Win'. Right now, if 100 people come to the app each day, only 23 of them try out this spinning game. But, we know that people who spin are more likely to retain on the app and do transactions. Now, we want to get more people to play the game. So, the question is, how can we make sure that at least 50 people out of every 100 who visit the app each day will play 'Spin to Win'? What can we do to get more people interested in spinning the wheel?

INCENTIVES AND REWARDS:

1. Offer discounts, coupons, exclusive offers, or virtual currency.
2. Encourage more users to engage with the game.

GAMIFICATION ELEMENTS:

1. Enhance visuals, sound effects, and animations.
2. Make the spinning experience enjoyable and interactive.

```
In [ ]:
```