IMPORTING NECESSARY LIBRARIES

In [96]:
```
import numpy as np
import pandas as pd
import seaborn as sns                   #Visualisation
import matplotlib.pyplot as plt         #Visualisation
```

Reading CSV file Coffee_sales.csv

In [98]:
```
df = pd.read_csv("E:/Unified Mentor Projects/Coffee_sales.csv",header=0)  #Loc
```

In [99]:
```
df.head() #Printing Head(First 5 rows) of the dataframe
```

Out[99]:

	date	datetime	cash_type	card	money	coffee_name
0	2024-03-01	2024-03-01 10:15:50.520	card	ANON-0000-0000-0001	38.7	Latte
1	2024-03-01	2024-03-01 12:19:22.539	card	ANON-0000-0000-0002	38.7	Hot Chocolate
2	2024-03-01	2024-03-01 12:20:18.089	card	ANON-0000-0000-0002	38.7	Hot Chocolate
3	2024-03-01	2024-03-01 13:46:33.006	card	ANON-0000-0000-0003	28.9	Americano
4	2024-03-01	2024-03-01 13:48:14.626	card	ANON-0000-0000-0004	38.7	Latte

In [100]:
```
df.shape  #Printing the Total Dimensions(Rows,Columns) of the dataframe
```

Out[100]:
```
(1133, 6)
```

In [101]:
```
df.info()  #Describing the Data Types of each Column
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 1133 entries, 0 to 1132
Data columns (total 6 columns):
 #   Column       Non-Null Count  Dtype  
---  ------       --------------  -----  
 0   date         1133 non-null   object 
 1   datetime     1133 non-null   object 
 2   cash_type    1133 non-null   object 
 3   card         1044 non-null   object 
 4   money        1133 non-null   float64
 5   coffee_name  1133 non-null   object 
dtypes: float64(1), object(5)
memory usage: 53.2+ KB
```

In [102]:
```
df.isnull().sum()  #Checking Missing(null) Values in the dataframe
```

Out[102]:
```
date            0
datetime        0
cash_type       0
card           89
money           0
coffee_name     0
dtype: int64
```

In [103]:
```
#df = df.dropna()  #Dropping Missing Values from the dataframe
```

In [104]:
```
df[df['card'].isnull()]['cash_type'].value_counts()
```

Out[104]:
```
cash_type
cash    89
Name: count, dtype: int64
```

In [105]:
```
## From above output All of the transactions with null 'card' information are
```

In [106]:
```
#Convert date and datetime to datetme format
df['date']=pd.to_datetime(df['date'])
df['datetime']=pd.to_datetime(df['datetime'])
#Create column of Month, Weekdays, and Hours
df['month']=df['date'].dt.strftime('%Y-%m')
df['day']=df['date'].dt.strftime('%w')
df['hour']=df['datetime'].dt.strftime('%H')
df.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 1133 entries, 0 to 1132
Data columns (total 9 columns):
 #   Column       Non-Null Count  Dtype
---  ------       --------------  -----
 0   date         1133 non-null   datetime64[ns]
 1   datetime     1133 non-null   datetime64[ns]
 2   cash_type    1133 non-null   object
 3   card         1044 non-null   object
 4   money        1133 non-null   float64
 5   coffee_name  1133 non-null   object
 6   month        1133 non-null   object
 7   day          1133 non-null   object
 8   hour         1133 non-null   object
dtypes: datetime64[ns](2), float64(1), object(6)
memory usage: 79.8+ KB
```

In [107]:

```
# Let's Check the Monthly Data
monthly_sales = df.groupby(['coffee_name','month']).count()['date'].reset_inde
monthly_sales
```

Out[107]:

coffee_name	month	Americano	Americano with Milk	Cappuccino	Cocoa	Cortado	Espresso	Hot Chocolate
0	2024-03	36	34	20	6	30	10	22
1	2024-04	35	42	43	6	19	7	13
2	2024-05	48	58	55	9	17	8	14
3	2024-06	14	69	46	5	19	10	14
4	2024-07	36	65	32	9	14	14	11

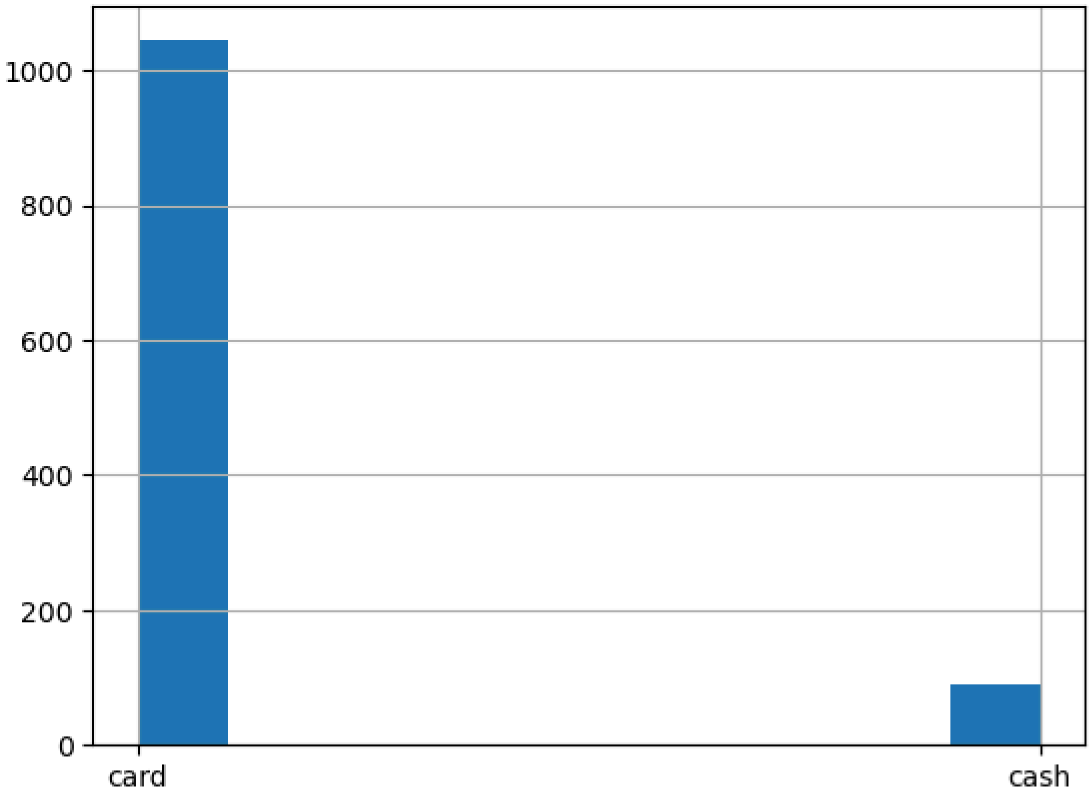
Exploratory Data Analysis (EDA)

In [109]:

```
df['cash_type'].hist()
```

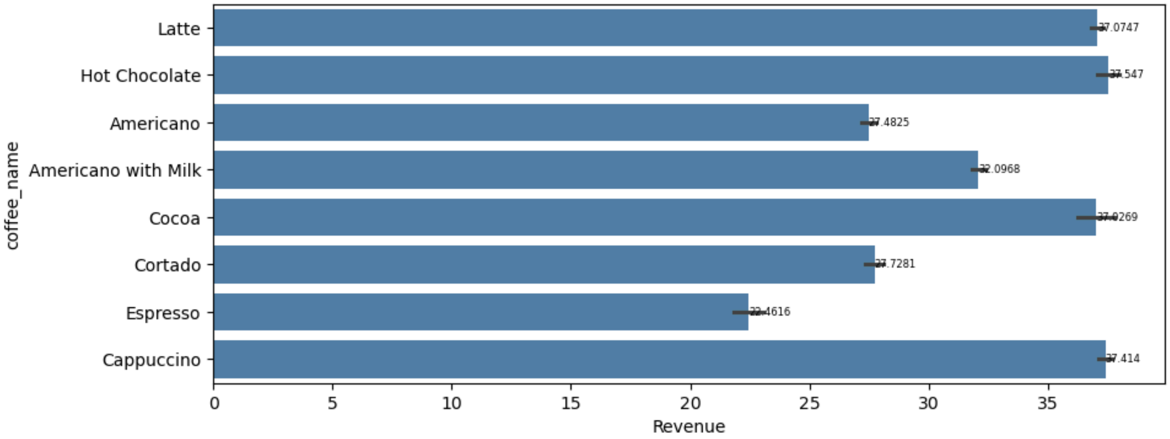
Out[109]:

```
<Axes: >
```



In [110]:
```
#Plotting Barplot for Revenue generated by each coffee
plt.figure(figsize=(10,4))
x = sns.barplot(data=df,x='money',y='coffee_name',color='steelblue')
x.bar_label(x.containers[0], fontsize=6)
plt.xlabel('Revenue')
```

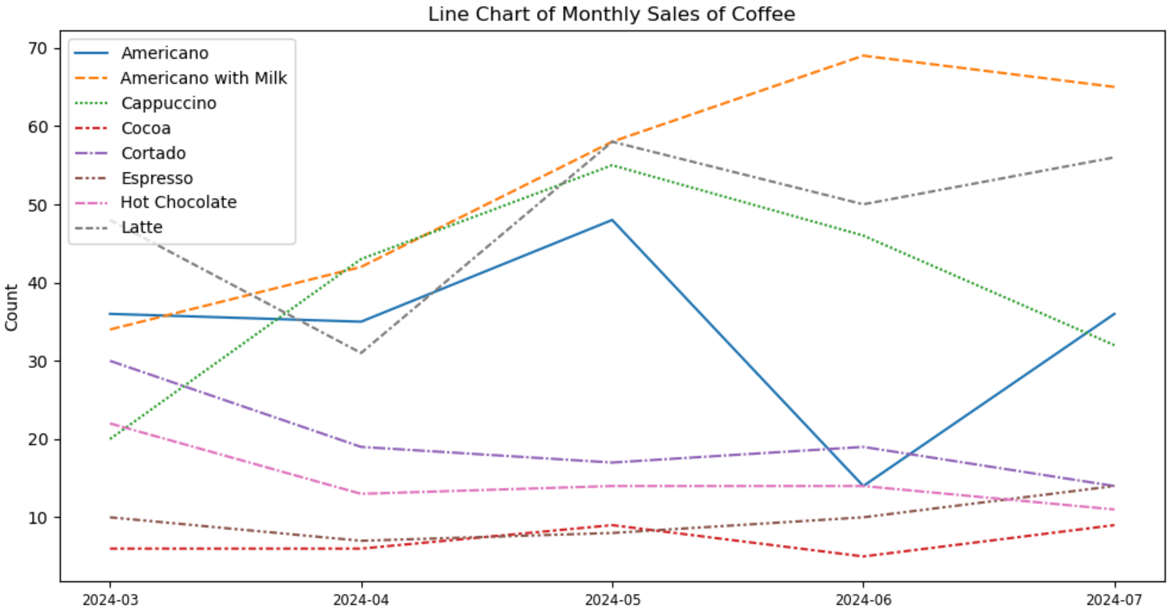
Out[110]:
```
Text(0.5, 0, 'Revenue')
```



Latte is the product with the highest revenue, while Expresso is the one at the bottom.

In [112]:
```
#Plotting Line Chart of Monthly sales of Coffee
plt.figure(figsize=(12,6))
sns.lineplot(data=monthly_sales,alpha=1)
plt.legend(loc='upper left')
plt.xticks(range(len(monthly_sales['month'])),monthly_sales['month'],size='sma
plt.title("Line Chart of Monthly Sales of Coffee")
plt.ylabel('Count')
```

Out[112]:
```
Text(0, 0.5, 'Count')
```



As shown in the line chart above, Americano with Milk and Latte, and Cappuccino are top selling coffee types, while Cocoa and Expresso have

lowest sales. Additionally, Americano with Milk and Latte show an upward trending.

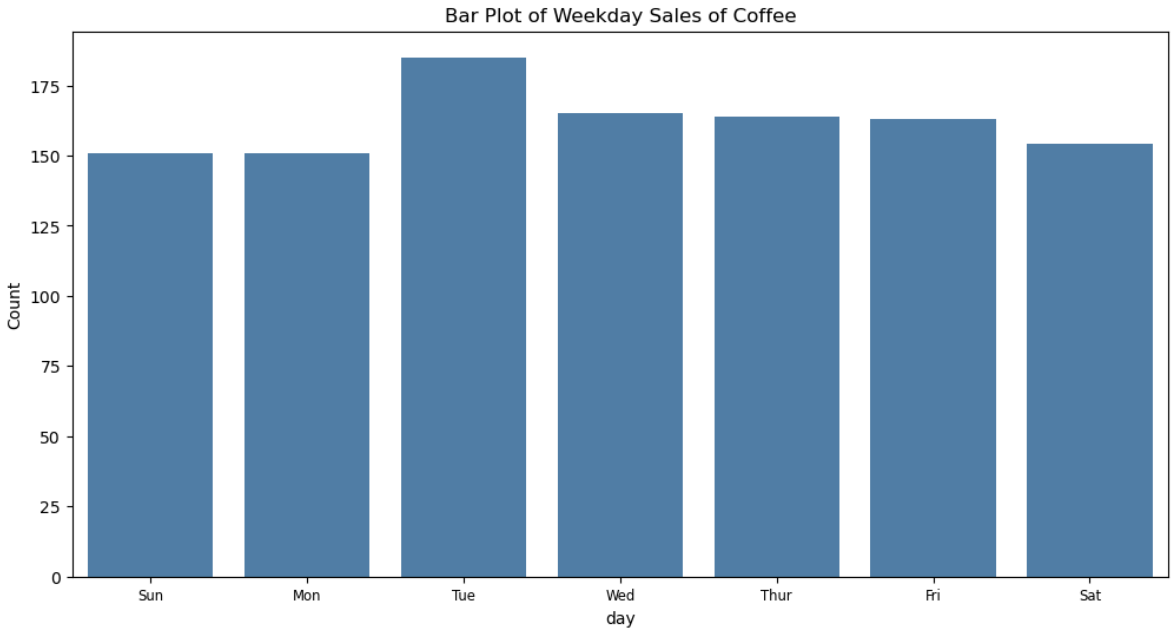
In [114]:
```
weekday_sales = df.groupby(['day']).count()['date'].reset_index().rename(colum
weekday_sales
```

Out[114]:

	day	count
0	0	151
1	1	151
2	2	185
3	3	165
4	4	164
5	5	163
6	6	154

In [115]:
```
#Plotting Barplot of Weekday Sales of Coffee
plt.figure(figsize=(12,6))
sns.barplot(data=weekday_sales,x='day',y='count',color='steelblue')
plt.xticks(range(len(weekday_sales['day'])),['Sun','Mon','Tue','Wed','Thur','F
plt.ylabel("Count")
plt.title("Bar Plot of Weekday Sales of Coffee")
```

Out[115]:
```
Text(0.5, 1.0, 'Bar Plot of Weekday Sales of Coffee')
```



In [116]:

```
#Let's see daily sales of coffee below
daily_sales = df.groupby(['coffee_name','date']).count()['datetime'].reset_inc
daily_sales
```

Out[116]:

coffee_name	date	Americano	Americano with Milk	Cappuccino	Cocoa	Cortado	Espresso	Hot Chocolate
0	2024-03-01	1.0	4.0	0.0	1.0	0.0	0.0	3.0
1	2024-03-02	3.0	3.0	0.0	0.0	0.0	0.0	0.0
2	2024-03-03	1.0	2.0	0.0	1.0	2.0	0.0	2.0
3	2024-03-04	0.0	1.0	0.0	0.0	0.0	1.0	0.0
4	2024-03-05	0.0	0.0	0.0	1.0	1.0	0.0	4.0
...	...	...	...	...	...	...	...	...
145	2024-07-27	0.0	5.0	4.0	0.0	0.0	2.0	0.0
146	2024-07-28	0.0	1.0	0.0	0.0	0.0	1.0	0.0
147	2024-07-29	3.0	2.0	2.0	1.0	0.0	0.0	2.0
148	2024-07-30	2.0	12.0	2.0	0.0	3.0	2.0	0.0
149	2024-07-31	2.0	6.0	1.0	2.0	4.0	0.0	0.0

150 rows × 9 columns

In [117]:

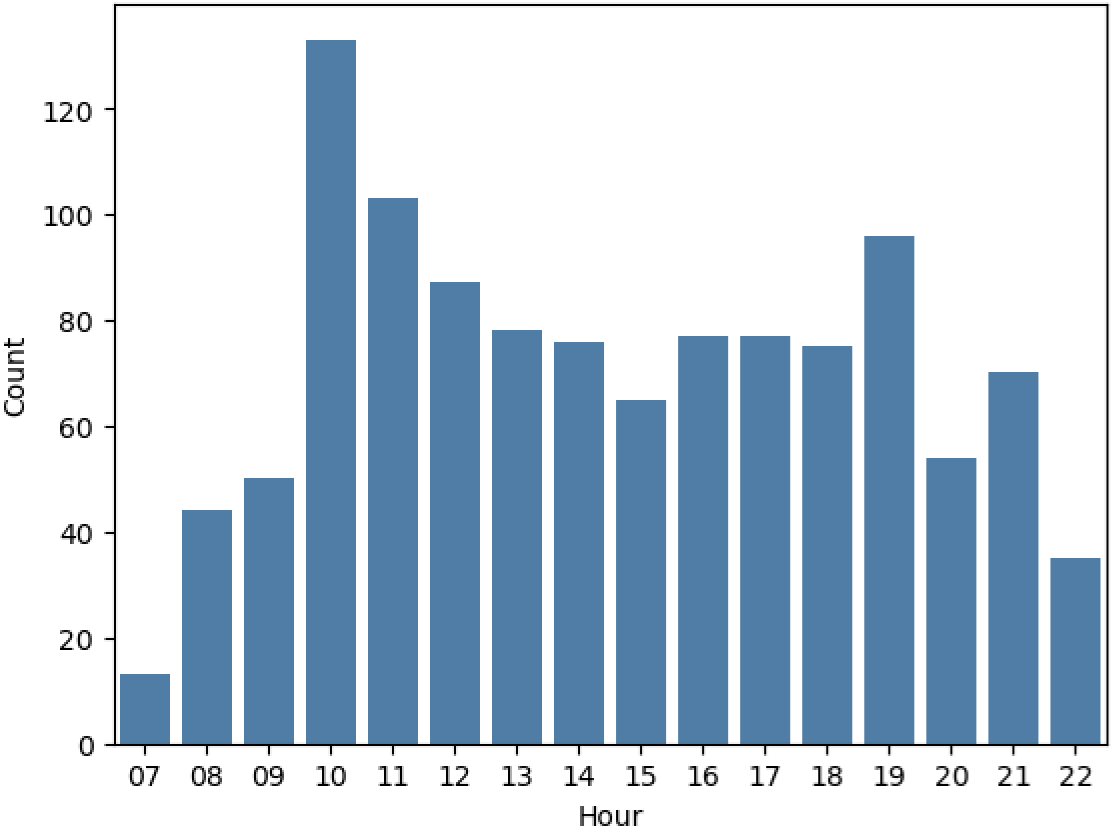
```
#Let's see count of hourly sales of coffee
hourly_sales = df.groupby(['hour']).count()['date'].reset_index().rename(colum
hourly_sales
```

Out[117]:

	hour	count
0	07	13
1	08	44
2	09	50
3	10	133
4	11	103
5	12	87
6	13	78
7	14	76
8	15	65
9	16	77
10	17	77
11	18	75
12	19	96
13	20	54
14	21	70
15	22	35

```
In [118]: #Plotting BarPlot for count of Hourly sales of coffee
          sns.barplot(data=hourly_sales,x='hour',y='count',color='steelblue')
          plt.xlabel('Hour')
          plt.ylabel('Count')
```

```
Out[118]: Text(0, 0.5, 'Count')
```



Overall, two peak hours within each day can be observed: 10:00am and 7:00pm.

In [120]:

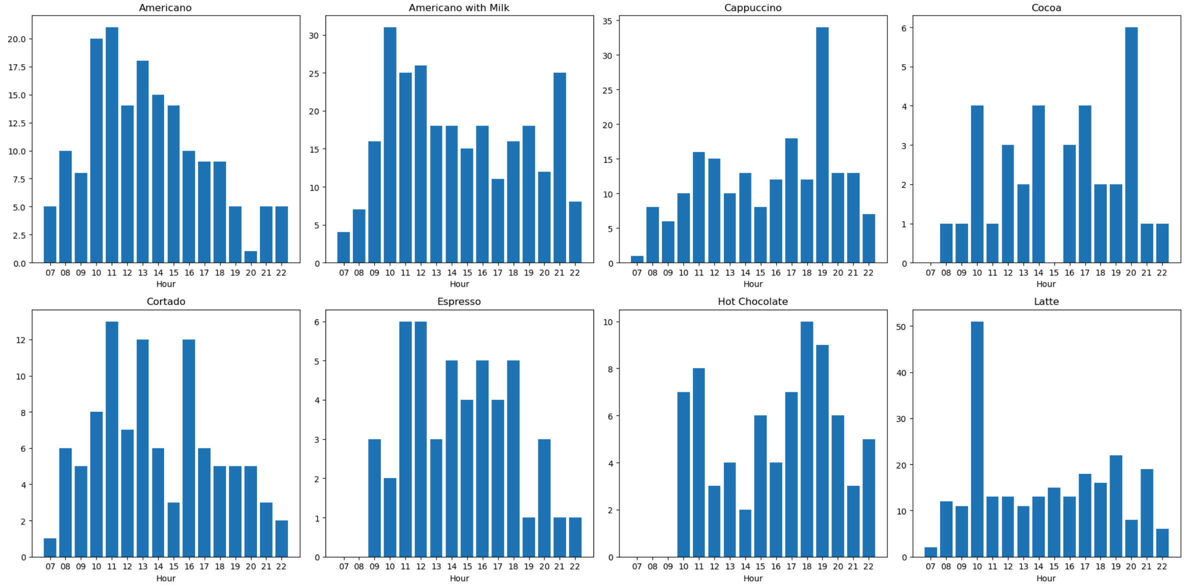
```
hourly_sales_by_coffee = df.groupby(['hour','coffee_name']).count()['date'].re
hourly_sales_by_coffee
```

Out[120]:

coffee_name	hour	Americano	Americano with Milk	Cappuccino	Cocoa	Cortado	Espresso	Hot Chocolate
0	07	5.0	4.0	1.0	0.0	1.0	0.0	0.0
1	08	10.0	7.0	8.0	1.0	6.0	0.0	0.0
2	09	8.0	16.0	6.0	1.0	5.0	3.0	0.0
3	10	20.0	31.0	10.0	4.0	8.0	2.0	7.0
4	11	21.0	25.0	16.0	1.0	13.0	6.0	8.0
5	12	14.0	26.0	15.0	3.0	7.0	6.0	3.0
6	13	18.0	18.0	10.0	2.0	12.0	3.0	4.0
7	14	15.0	18.0	13.0	4.0	6.0	5.0	2.0
8	15	14.0	15.0	8.0	0.0	3.0	4.0	6.0
9	16	10.0	18.0	12.0	3.0	12.0	5.0	4.0
10	17	9.0	11.0	18.0	4.0	6.0	4.0	7.0
11	18	9.0	16.0	12.0	2.0	5.0	5.0	10.0
12	19	5.0	18.0	34.0	2.0	5.0	1.0	9.0
13	20	1.0	12.0	13.0	6.0	5.0	3.0	6.0
14	21	5.0	25.0	13.0	1.0	3.0	1.0	3.0
15	22	5.0	8.0	7.0	1.0	2.0	1.0	5.0

In [121]:

```
fig, axs = plt.subplots(2, 4, figsize=(20, 10))
# Flatten the array of subplots for easy iteration
axs = axs.flatten()
# Loop through each column in the DataFrame, skipping the 'Index' column
for i, column in enumerate(hourly_sales_by_coffee.columns[1:]):
# Skip the first column ('Index')
    axs[i].bar(hourly_sales_by_coffee['hour'],hourly_sales_by_coffee[column])
    axs[i].set_title(f'{column}')
    axs[i].set_xlabel('Hour')
#axs[i].set_ylabel('Sales')
plt.tight_layout()
# Show the plot
plt.show()
```



The plots above illustrate the shopping traffic for each product throughout the day. Notably, all products experience a peak in traffic around 10:00 AM, with this trend being particularly pronounced for Latte. Additionally, Cappuccino, Cocoa, and Hot Chocolate tend to be more popular during the evening hours, specifically between 6:00pm and 8:00pm.

Conclusion

From the analysis above, we have uncovered valuable insights into customer shopping patterns on a daily and weekly basis. We have identified the most popular coffee products and observed the shopping trends over time. These

findings are instrumental in optimizing inventory planning, designing the layout of vending machines, and determining the ideal restock times for coffee products.