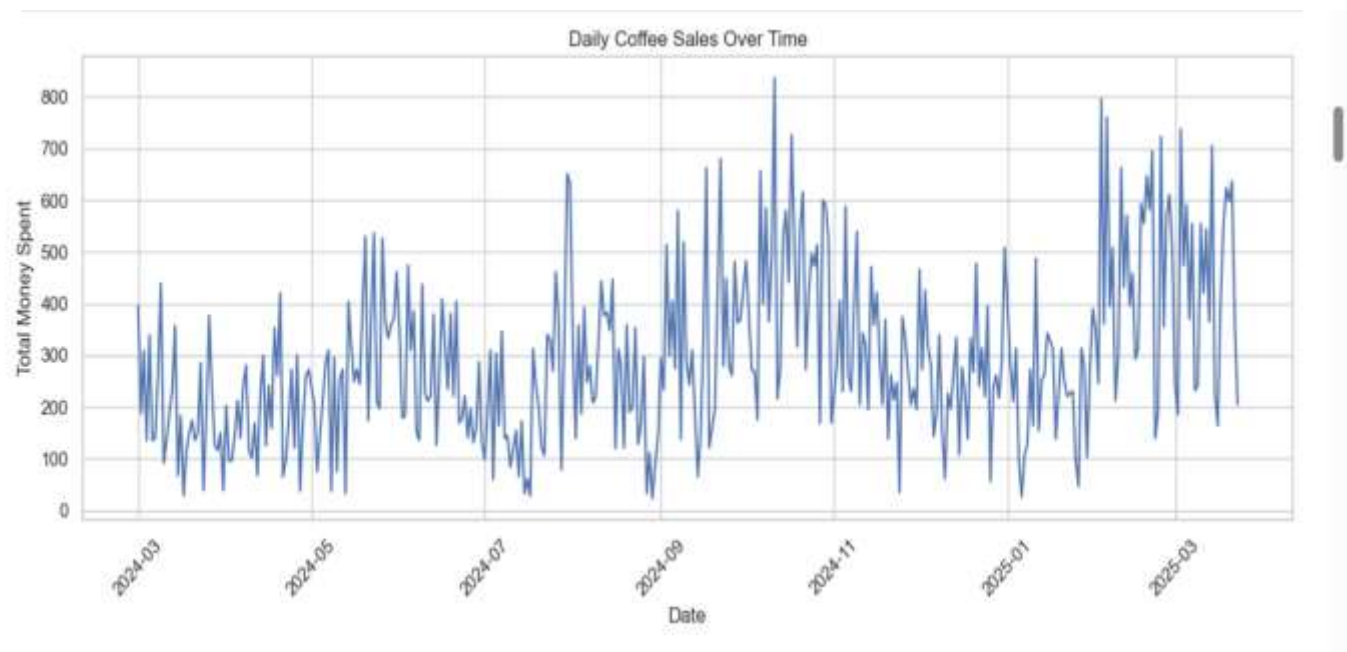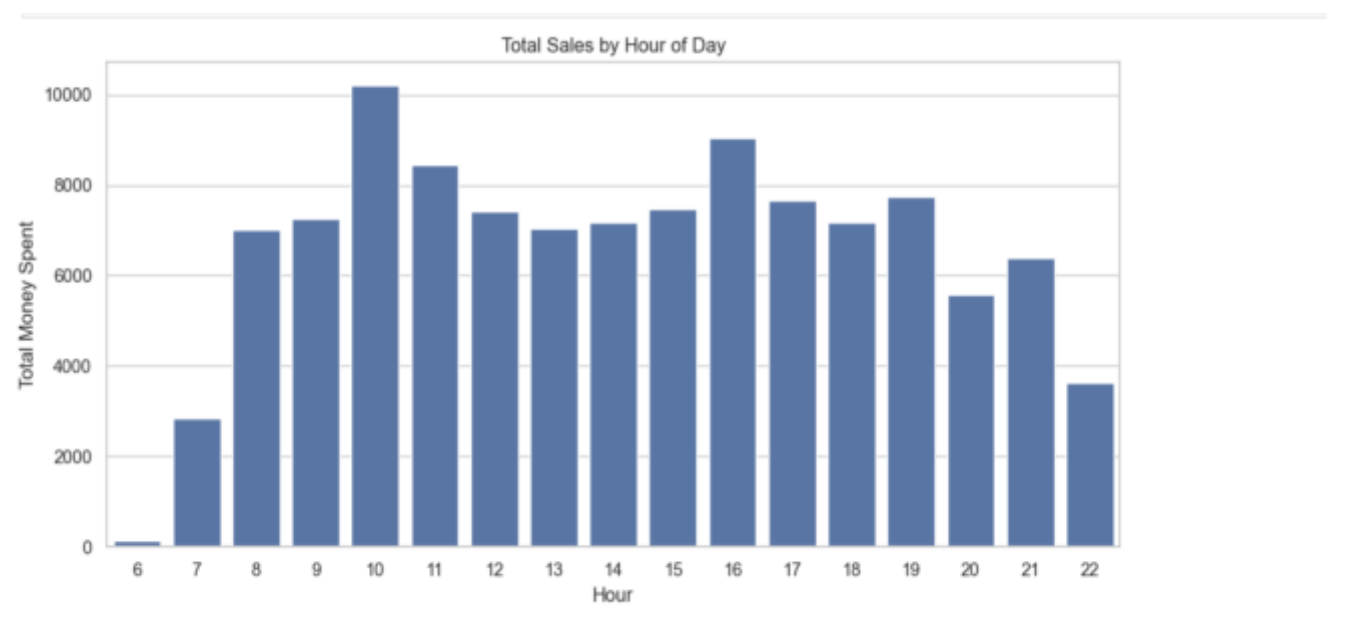# FINAL REPORT

1. Daily Coffee Sales Over Time

Line chart showing total coffee sales for each day. This visual helps identify trends, spikes, and dips in daily revenue over the dataset period.
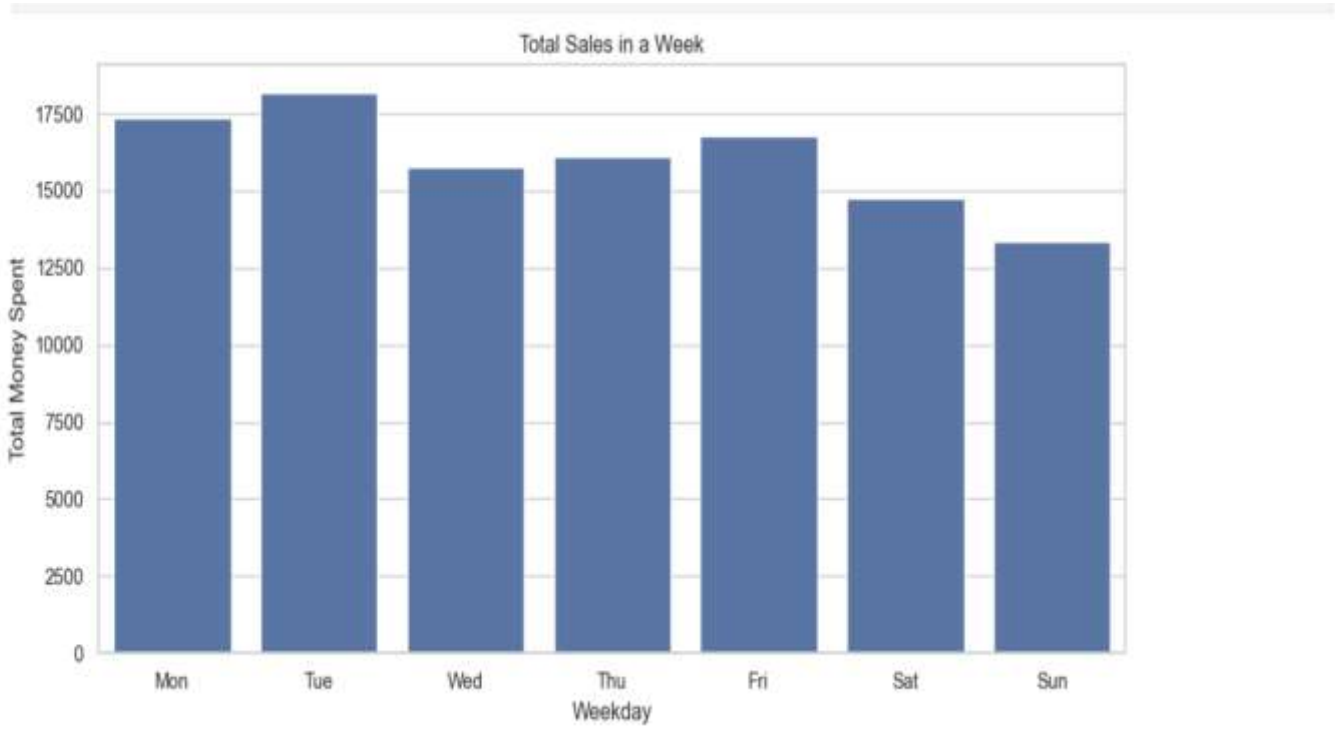

2. Total Sales by Hour of Day

Bar chart showing total sales aggregated by each hour. Useful for understanding peak hours of customer purchases.

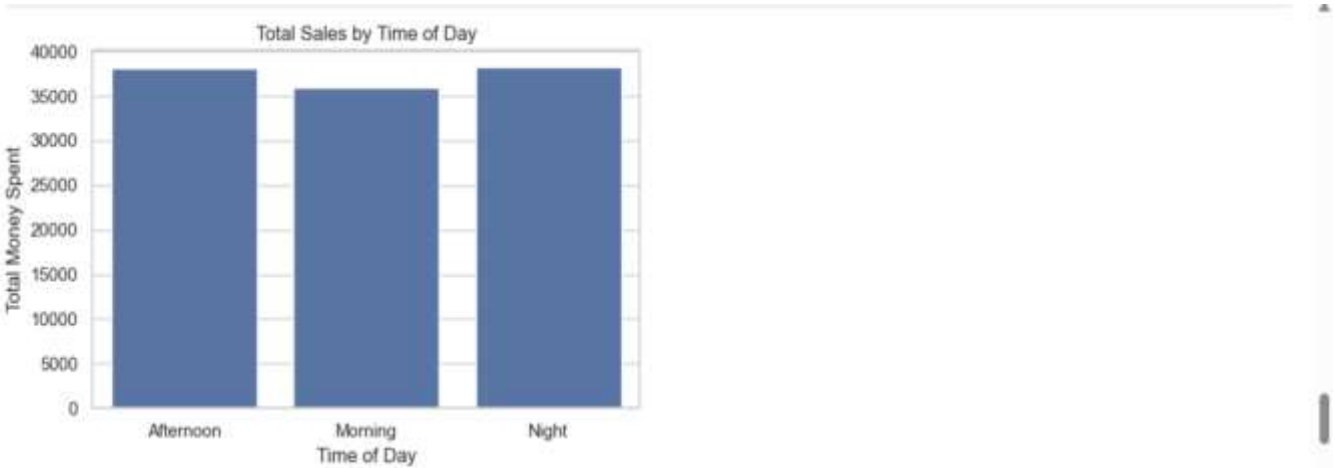## 3. Total Sales in a Week (Weekday Analysis)

Bar chart showing total sales for each weekday. Helps identify which days generate the most revenue.

4. Total Sales by Time of Day

Bar chart comparing total sales across general times of day (Morning, Afternoon, Night). Provides insights into customer purchasing patterns.

	Time_of_Day	money
0	Afternoon	38130.04
1	Morning	35929.20
2	Night	38186.34

5. *Table showing the first 10 rows of the dataset after feature engineering. Columns include:*

- **hour_of_day – original hour of the transaction**

- **HourCategory – categorized time of day (Morning, Afternoon, Night)**

- **Weekday – day of the week for the transaction**

- **IsWeekend – boolean indicator for weekend vs. weekday**

This table demonstrates how raw data was transformed to enable analysis by time-of-day and weekday/weekend patterns.

	hour_of_day	HourCategory	Weekday	IsWeekend
0	10	Morning	Fri	False
1	12	Afternoon	Fri	False
2	12	Afternoon	Fri	False
3	13	Afternoon	Fri	False
4	13	Afternoon	Fri	False
5	15	Afternoon	Fri	False
6	16	Afternoon	Fri	False
7	18	Night	Fri	False
8	19	Night	Fri	False
9	19	Night	Fri	False

6.Statistical Test Results

The independent samples t-test produced a **t-statistic of -0.5005**. The negative sign reflects that the mean sales on weekends (31.57) were marginally lower than those on weekdays (31.67). However, the absolute value of the statistic is close to zero, indicating that the observed difference is minimal relative to the variability in sales data.

The associated **p-value of 0.6168** exceeds the conventional significance threshold of 0.05. This suggests that the observed difference is not statistically significant and could plausibly have occurred by random chance if there were truly no difference between weekend and weekday sales.

Group Means:

- Average weekend sales: **31.57**

- Average weekday sales: **31.67**

Conclusion:
Based on these results, we **fail to reject the null hypothesis**. There is no statistically significant difference between weekend and weekday sales. In practical terms, sales performance appears to remain consistent regardless of the day of the week.

Executive Summary:
Sales are statistically the same on weekends and weekdays, indicating that day of the week has no meaningful impact on sales performance.

t-statistic: -0.5004864855782297
p-value: 0.6167636384727557
Average weekend sale: 31.57433070866142
Average weekday sale: 31.66892480300978
Fail to reject null hypothesis: No significant difference

ANOVA Test Results

The analysis of variance (ANOVA) yielded an **F-statistic of 78.22**, which is very large, indicating that the differences among group means are substantial compared to the variation within groups.

The associated **p-value of 5.74 × 10^{-34}** is far below the standard threshold of 0.05, providing extremely strong evidence against the null hypothesis that all time-of-day sales means are equal.

Group Means:

- Average morning sales: **30.42**
- Average afternoon sales: **31.64**
- Average night sales: **32.89**

Conclusion:
We **reject the null hypothesis** and conclude that sales vary significantly depending on the time of day. The results show a clear upward trend in sales, with the lowest values in the morning and the highest at night.

Executive Summary:
Sales differ significantly by time of day, with **night sales being highest** and **morning sales lowest**, suggesting that time period is an important factor influencing sales performance.

F-statistic: 78.21775635057196
p-value: 5.738878249433681e-34
Average Morning sale: 30.42269263336156
Average Afternoon sale: 31.6431867219917
Average Night sale: 32.89090439276485

8.Average Sales by Time of Day

Bar chart showing average money spent per transaction by time of day. Includes numerical values on top of bars to make comparison easier.

Average Coffee Sales by Time of Day