# Data Analysis Report

## 1. Introduction

- Purpose of the Analysis: The primary objective of this analysis is to develop data cleaning, manipulation, and analysis skills by performing a comprehensive review of customer and sales data. The analysis covers various aspects such as trend identification, sales performance by category and product, and customer behavior segmentation.

- Dataset Overview: Two datasets were utilized;

1. Sales data, including details such as product codes, names, categories, and sales totals.
2. Customer data, containing demographic and spending information.

## 2. Data Cleaning and Manipulation

## 2.1 Missing and Outlier Analysis

- **Steps Taken:**

No missing values were detected in the datasets. Outliers were visualized using boxplots for columns such as 'price' and 'spending amount.
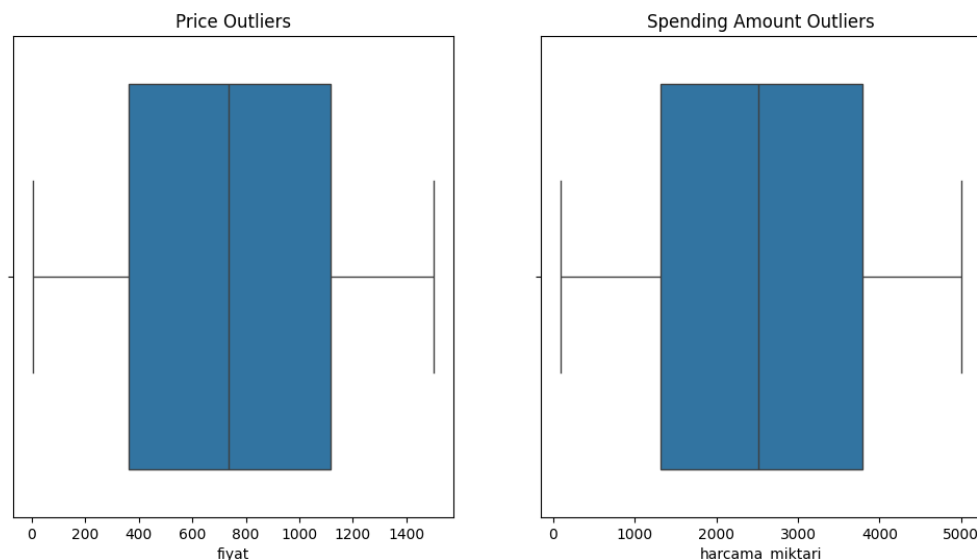


*Figure 1: Boxplot: Price Outliers and Boxplot: Spending Amount Outliers*

**Key Observations:**

- Most values were within expected ranges, but some extreme outliers were identified in both datasets.

## 3. Time Series Analysis
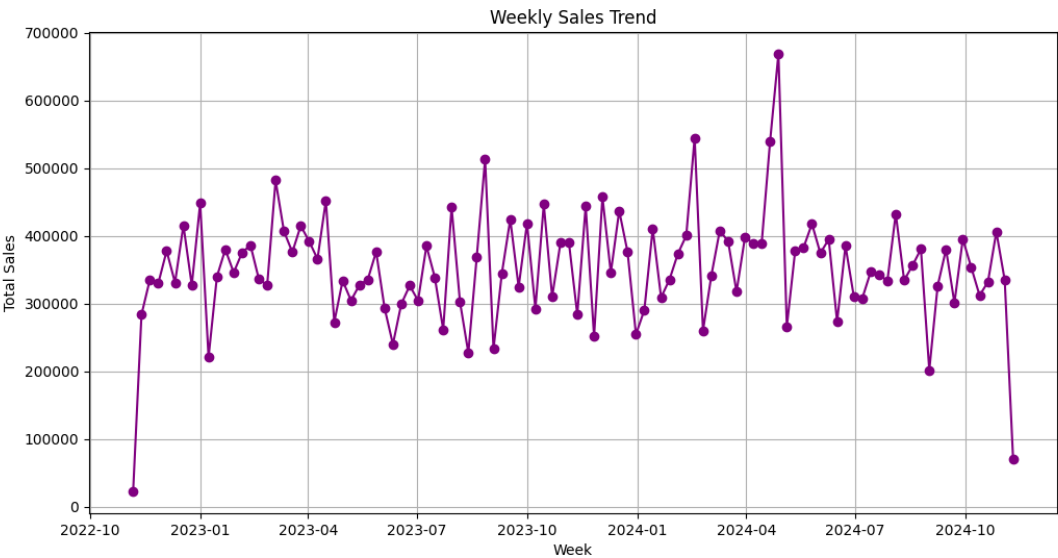
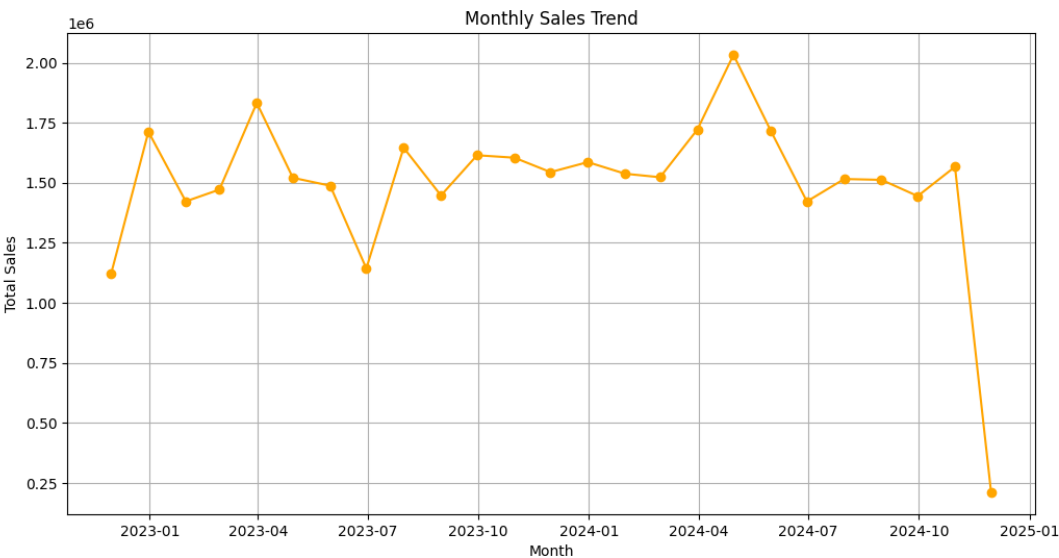## 3.1 Weekly and Monthly Sales Trends



*Figure 2: Weekly Sales Trend*



*Figure 3: Monthly Sales Trend*

## Observations from the Weekly Sales Trend:

1. **Fluctuations**:
   - Weekly sales exhibit noticeable fluctuations, with certain weeks showing significant spikes.
   - These spikes may align with promotional activities or seasonal demand.
2. **Seasonal Peaks**:
   - Periodic peaks in sales suggest seasonality or marketing campaigns.
3. **Dips**:
   - Sharp declines in some weeks could indicate seasonal slowdowns or external factors affecting sales.

## Observations from the Monthly Sales Trend:

1. **Overall Stability with Peaks**:
   - Monthly sales show a stable trend, with significant growth in some months.
   - Peaks are likely associated with specific events or campaigns.
2. **End-of-Year Decline**:
   - A noticeable drop in sales at the end of 2024 may be due to incomplete data or an actual decline in demand.

## Recommendations:

1. **Seasonal Marketing**:
   - Leverage seasonal peaks by launching targeted promotions during high-demand periods.
2. **Minimize Dips**:
   - Investigate weeks with low sales and develop strategies to mitigate these declines.

## 4. Categorical and Numerical Analysis
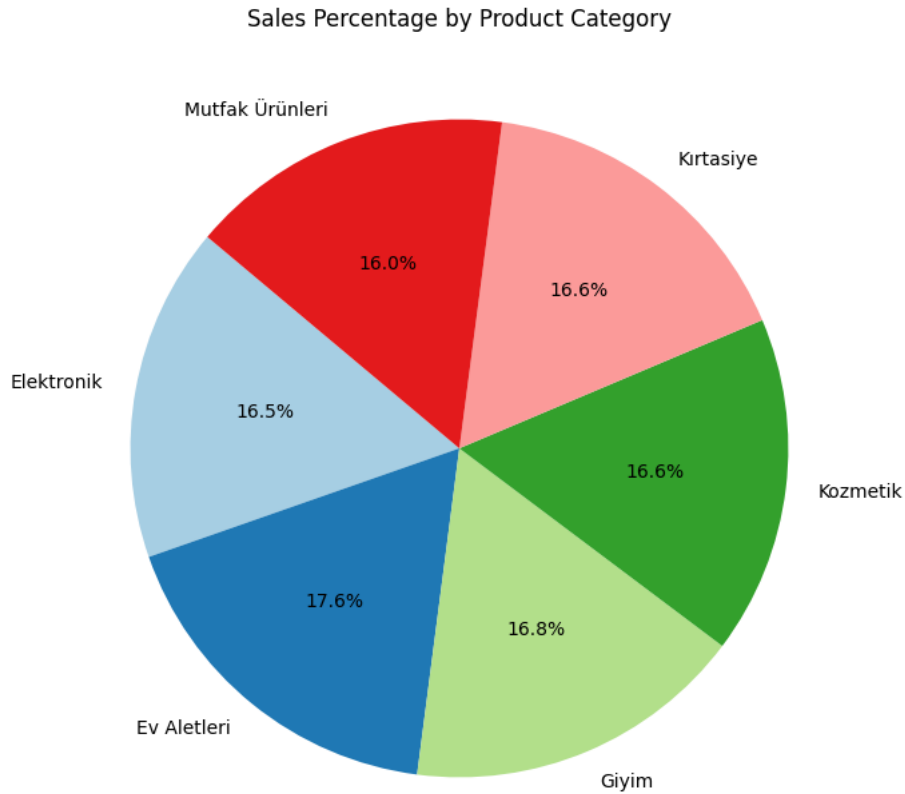
## 4.1 Sales by Category

Sales Percentage by Product Category



*Figure 4: Sales Percentage by Category*

## Observations:

1. **Top Contributor**:
   - o **Ev Aletleri (Home Appliances)** is the largest contributor, with 17.59% of total sales.
2. **Balanced Distribution**:
   - o Sales are relatively evenly distributed, with no single category dominating excessively.
3. **Lowest Contributor**:
   - o **Mutfak Ürünleri (Kitchen Products)** accounts for the lowest share (15.96%), still significant.

## Recommendations:

1. **Sustain High Performers**:

   o  Invest in sustaining growth for categories like **Ev Aletleri** through exclusive offers or product bundling.

2. **Grow Lower Categories**:

   o  Develop marketing strategies to increase sales for **Mutfak Ürünleri** through targeted campaigns.
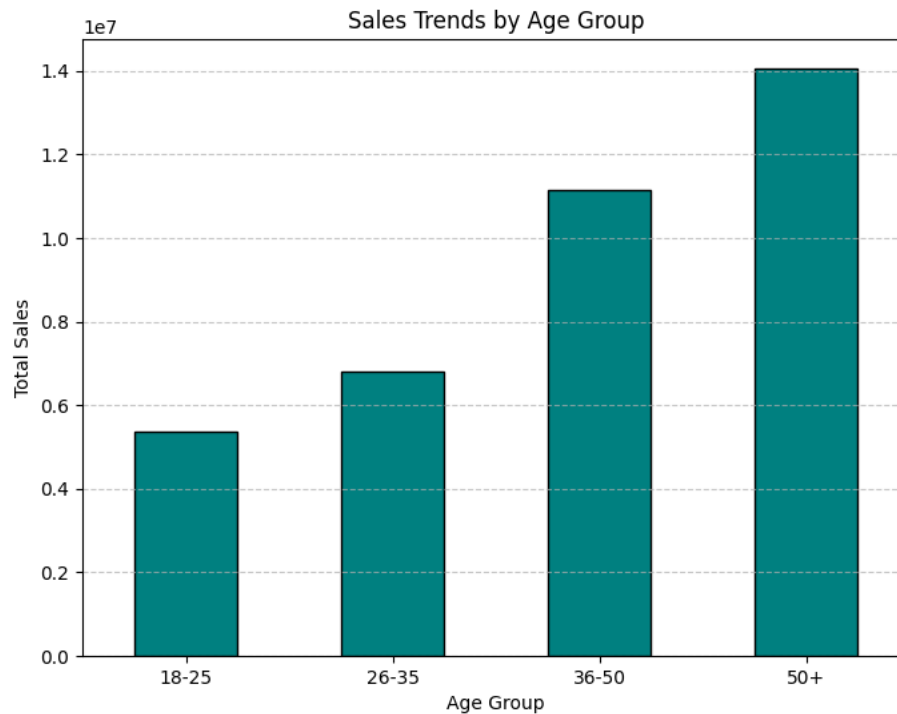
## 4.2 Sales by Age Group



*Figure 5: Sales by Age Group*

## Observations:

1. **Top Contributing Age Group**:

   •  The **50+ age group** contributes the most, likely due to higher purchasing power.

2. **Young Adults (18-25)**:

   •  This group shows the lowest sales, reflecting limited spending power or engagement.

## Recommendations:

1. **Target Older Segments**:
   - Focus on 50+ and 36-50 age groups with premium product campaigns.
2. **Engage Younger Customers**:
   - Use promotions or discounts to attract younger demographics.
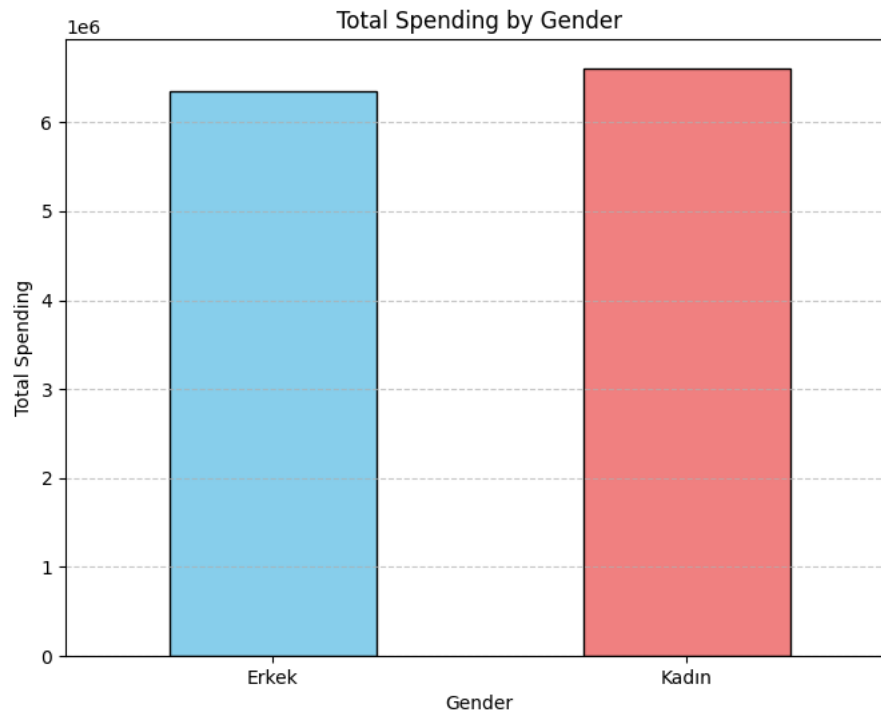
## 4.3 Gender-Based Spending


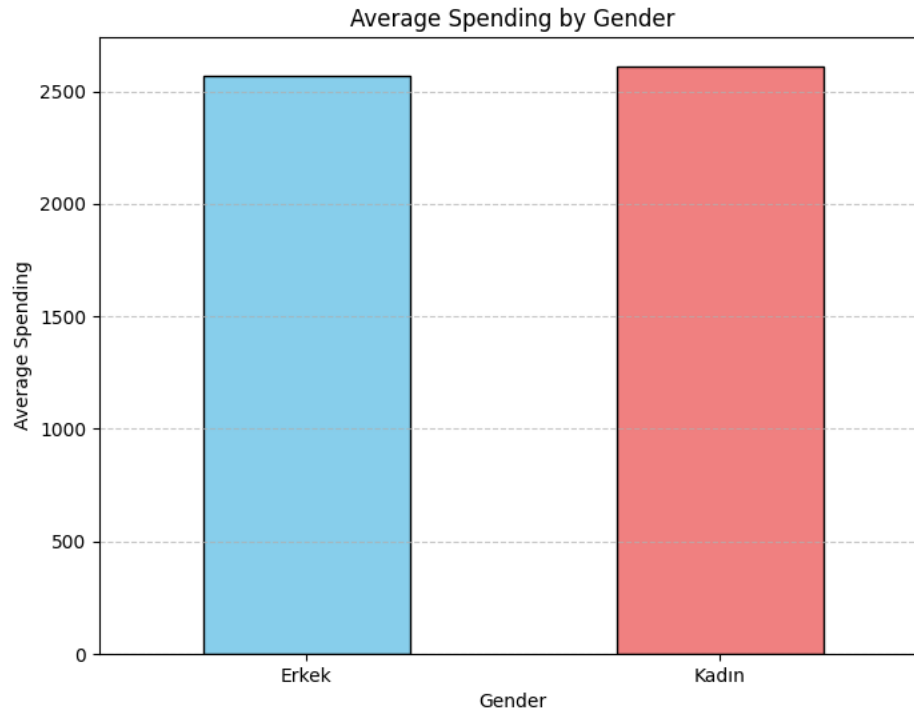
*Figure 6: Total Spending by Gender*

*Figure 7: Average Spending by Gender*

## Observations:

1. **Total Spending**:
   - Female customers have slightly higher total spending, suggesting they drive more revenue.

2. **Average Spending**:
   - The average spending per customer is nearly identical for both genders, indicating parity in spending behavior.

## Recommendations:

1. **Gender-Neutral Campaigns**:
   - Since both genders have similar spending habits, create inclusive marketing strategies.

2. **Gender-Specific Insights**:
   - Further analyze preferences to identify gender-driven opportunities for tailored campaigns.

# 5. Advanced Data Manipulation
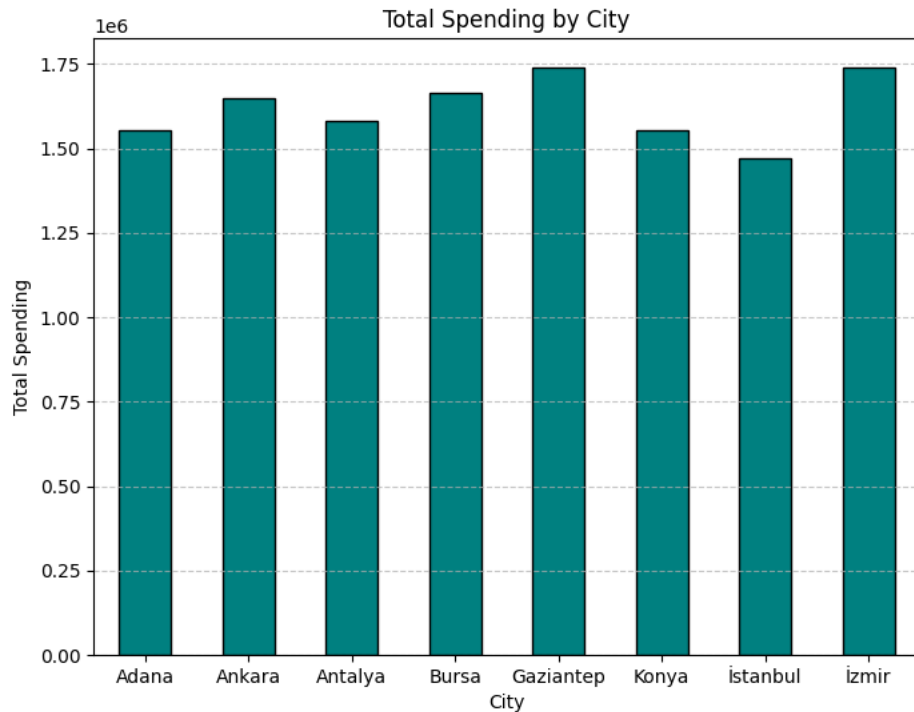
## 5.1 City-Wise Spending Analysis



*Figure 8: Total Spending by City*

## Observations:

1. **Highest Spending Cities**:
   o  **Gaziantep** leads with the highest total spending.
2. **Underperformance in Istanbul**:
   o  Despite its size, Istanbul ranks lower in total spending, indicating potential market challenges.

## Recommendations:

1. **Capitalize on Top Cities**:
   o  Invest in loyalty programs for high-performing cities like Gaziantep and Izmir.
2. **Address Istanbul's Gap**:
   o  Investigate and address barriers to sales growth in Istanbul.
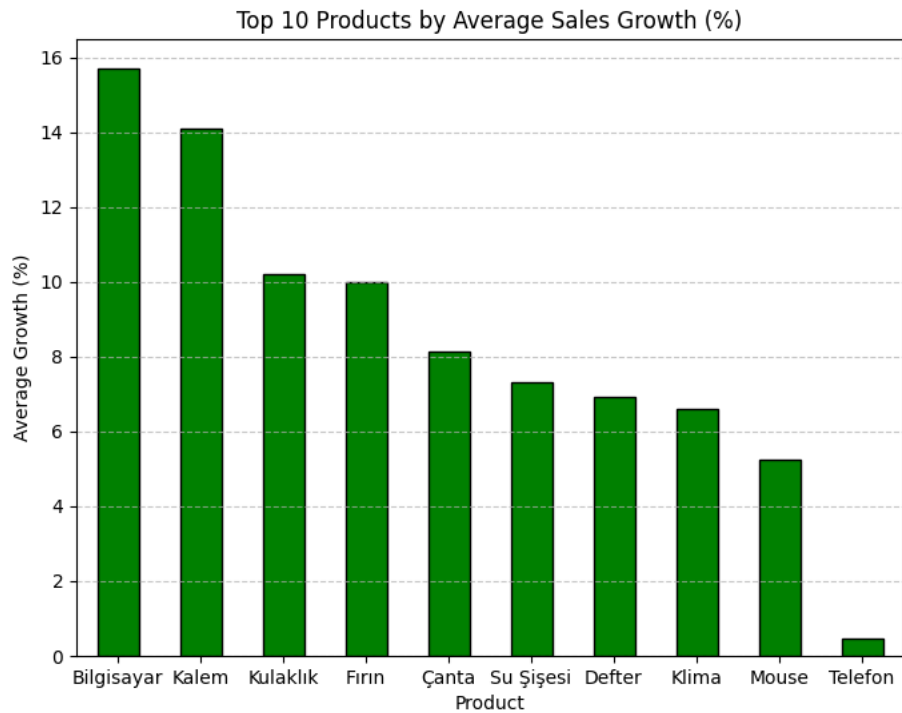
## 5.2 Average Sales Growth by Product



*Figure 9: : Top Products by Average Sales Growth (%)*

## Observations:

1. **Top Performers**:
   - o **Bilgisayar (Computer)** shows the highest growth (15.70%), followed by **Kalem (Pen)**.
2. **Low Growth**:
   - o **Telefon (Phone)** has the lowest growth, suggesting market saturation or competitive pressures.

## Recommendations:

1. **Invest in Growth Drivers**:
   - o Prioritize inventory and promotions for high-growth products like **Bilgisayar**.
2. **Analyze Lagging Products**:
   - o Review pricing strategies or campaigns for underperforming products.

## 6. Conclusion

The analysis revealed several key insights into sales and customer behavior, providing a foundation for data-driven decision-making:

**Key Findings:**

- **Category Trends**: Electronics and Clothing emerged as top-performing categories, while Kitchen Products showed potential for growth.

- **Customer Demographics**:
  - Older customers (50+ age group) contribute significantly to sales, demonstrating higher purchasing power.
  - Younger customers (18-25) show lower spending, suggesting untapped opportunities to engage this segment.

- **Regional Performance**:
  - Cities like Gaziantep and Izmir dominate spending, highlighting their importance as revenue drivers.
  - Istanbul, despite its large population, underperforms, indicating potential market challenges or fragmented demand.

- **Product Growth**:
  - High-growth products like Computers and Pens exhibit strong demand and could be leveraged for strategic marketing.
  - Low-growth products, such as Phones, may require pricing strategy reviews or targeted campaigns.

**Opportunities and Recommendations:**

1. **Expand High-Performing Segments**:
   - Invest in sustaining the growth of Electronics and Clothing categories through exclusive campaigns or product bundling.
   - Capitalize on high-growth products like Computers and Pens to maximize revenue.

2. **Target Underperforming Areas**:
   - Develop targeted marketing strategies to address challenges in Istanbul and boost sales in Kitchen Products.
   - Introduce promotions or loyalty programs for younger customer segments to increase engagement.

3. **Monitor Trends**:

- Continuously analyze sales data to track seasonal fluctuations and market dynamics.

- Focus on top-spending regions like Gaziantep and Izmir to further strengthen their contributions.