Sales Trend & Segment Analysis for Product Strategy

(A Business Analytics Case Study for Lognormal Analytics)

Presented by:

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Objective Overview

Main Objective

- Segment Influence Analysis
- Trend Detection
- Competitor Impact Assessment
- Additional Strategic Insights

Data Understanding

Dataset Summary

- Dataset covers **10 products** across **3 categories**: Home Goods | Clothing | Electronics
- Total **1040 rows** (weekly observations)
- Time span: **May 2023 – May 2025** (104 weeks)

```
RangeIndex: 1040 entries, 0 to 1039
Data columns (total 14 columns):
 #   Column                  Non-Null Count  Dtype
---  ------                  --------------  -----
 0   Week                    1040 non-null   datetime64[ns]
 1   Product ID              1040 non-null   int64
 2   Category                1040 non-null   object
 3   Product Name            1040 non-null   object
 4   Price                   1040 non-null   float64
 5   Competitor Price        1040 non-null   float64
 6   Pricing Currency        1040 non-null   object
 7   Sales Volume            1023 non-null   float64
 8   Advertising Spend (EUR) 1020 non-null   float64
 9   Customer Reviews        1034 non-null   float64
 10  Weather Index           1040 non-null   int64
 11  Social Media Mentions   1040 non-null   int64
 12  Warehouse Stock Level   1040 non-null   int64
 13  Market Share Rank       1040 non-null   int64
dtypes: datetime64[ns](1), float64(5), int64(5), object(3)
```

Note*:
- Sales Volume had some missing values -> Imputed using median
- Currency is standardized to EUR

Segment Influence Analysis

Goal: Identify how different customer "types" (segments) are driving sales volume across categories.

Segment Creation (Proxy Segments Used): Since direct customer segments weren't available, proxy segments were derived using:

i.   **Price Tier** - Budget vs Premium

ii. **Buzz Level** - Based on Social Media Mentions

iii. **Customer Sentiment** - Based on Review Ratings

iv. **Ad Spend Level** - High vs Low Advertising Spend

Sales Volume by Segment Within Each Category
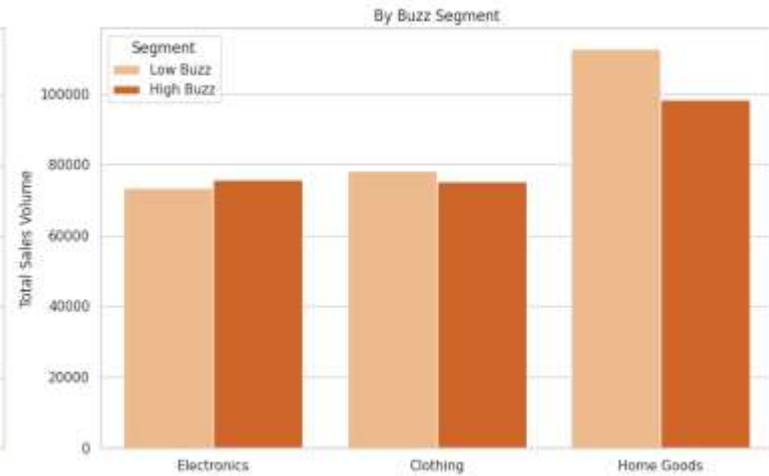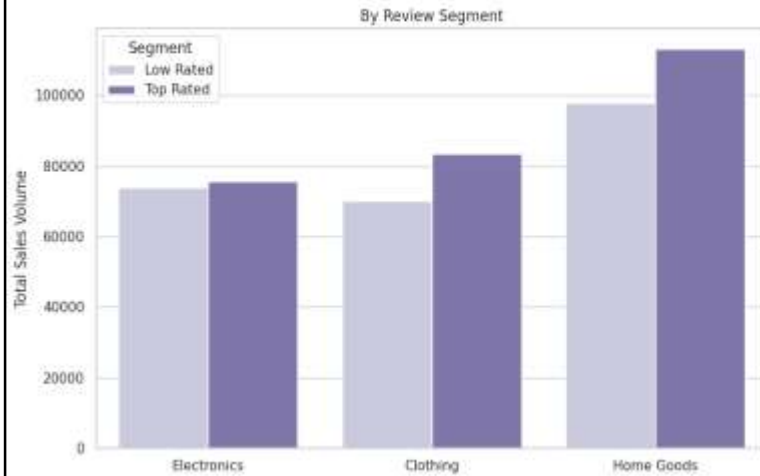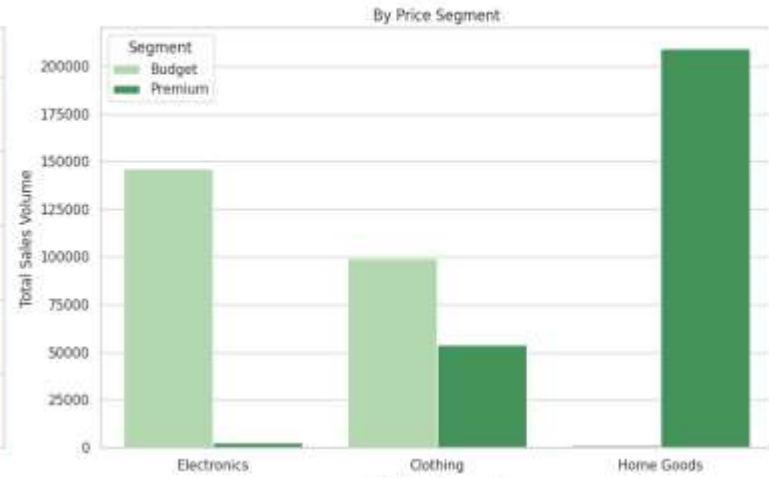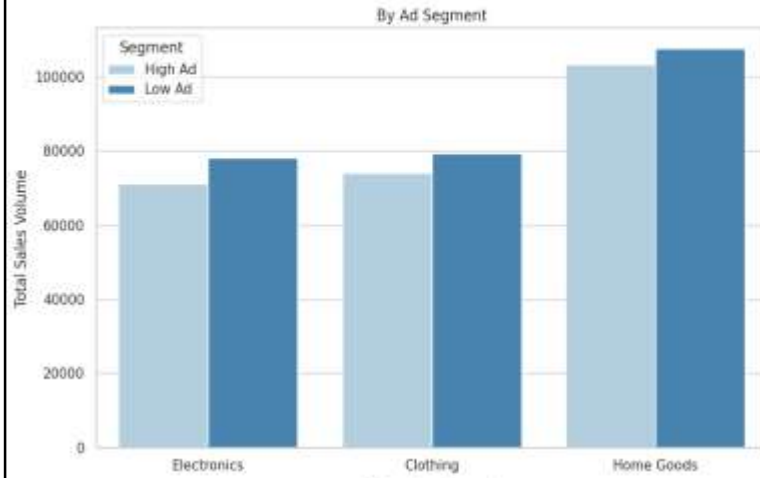
Key Insights

🏠 **Home Goods** sold the **highest quantity**, especially in **premium tier** - Customers perceive value in quality.

👗 **Clothing** saw better performance in **budget segments**, indicating price-sensitive behavior.

📢 **High-buzz & high-review products** consistently sold more across all categories - Trust & awareness matter.

📉 **High Ad Spend did not guarantee higher sales** - In many cases, **low-ad products outperformed**, suggesting **ad inefficiency** or **brand-driven pull**.
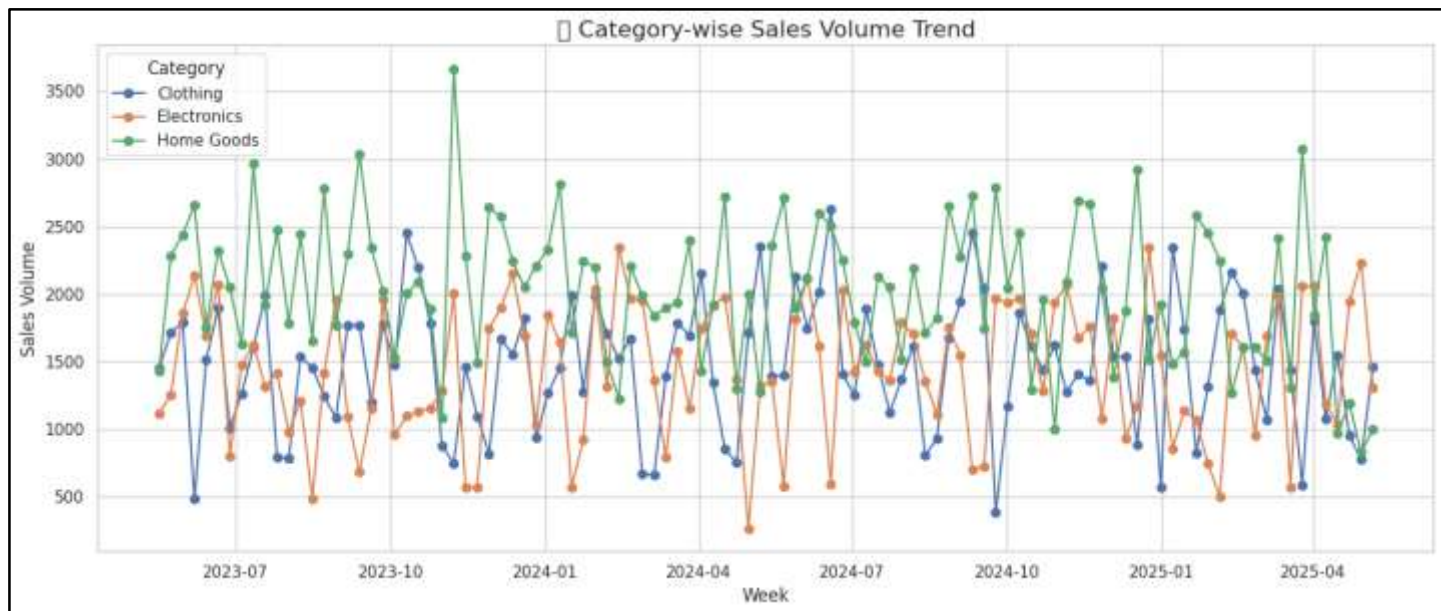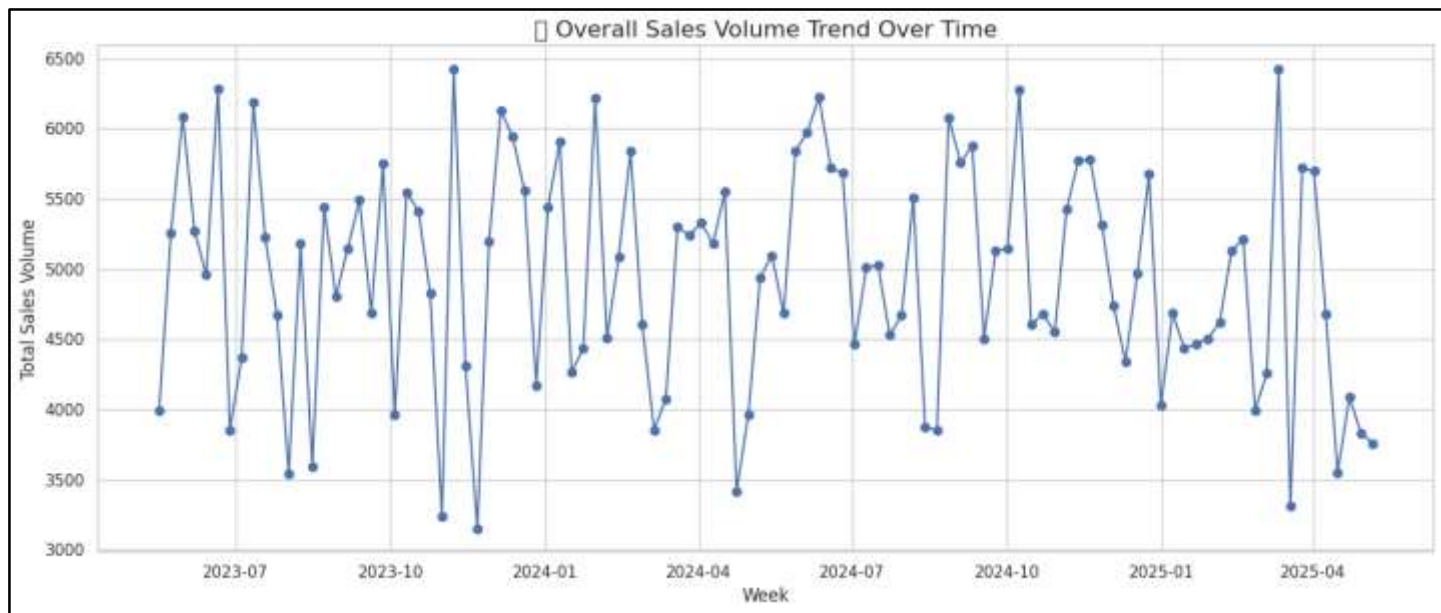
Trend Detection

Goal: Analyze how sales volume evolves over time to identify growth patterns, consistency, or seasonal trends.

Time Series Used

i.   Weekly data over **104 weeks** (May 2023 – May 2025)
ii.   Used Week column to visualize time-based sales trends

Overall Sales Volume Trend Over Time

Category-wise Sales Volume Trend

Key Trends Observed

Overall Sales Trend:

•Sales remained **stable** with no strong upward or downward pattern

•No visible **seasonality or weekly spikes** detected

Category-wise Trends:

•**Home Goods**: Consistent performance over 2 years

•**Electronics**: Minor fluctuations but mostly stable

•**Clothing**: Volatile, lacking clear momentum

Competitor Price Impact

Goal: Measure how competitor pricing affects our weekly sales volume and whether undercutting or premium pricing changes buyer behavior.

Approach:

- Created a new metric:

  - Price Diff = Competitor Price – Our Price

- Check Correlation Between Price Diff v/s Sales Volume

Key Findings

- **Correlation coefficient ≈ -0.005**
  - Virtually **no relationship** between price difference and sales volume

- Products with lower prices **did not necessarily** sell more

- In several categories, **premium-priced products performed equally well**

Operational & Environmental Factor Check
(Objective 4: Additional Strategic Insights)

Goal: Identify hidden operational or external influencers affecting sales volume.

<u>Variables Analysed</u>

A. **Warehouse Stock Level vs Sales Volume**
➤ Correlation: **-0.03** → Inventory availability **not a limiting factor**

B. **Weather Index vs Sales Volume**
➤ Correlation: **+0.02** → No seasonal/weather-based impact detected

C. **Lag Effect of Advertising**
➤ Correlation of ad spend (1-week lag) with sales: **insignificant**
➤ Implies **ad strategy isn't boosting immediate sales**

Recommendations

⬛ SEGMENT INFLUENCE (OBJECTIVE 1)

i. Focus on Home Goods Premium Tier- high performance despite price

ii. In Clothing, push budget-friendly SKUs - price-sensitive customers

iii. Boost review generation & social media buzz - stronger sales drivers than price or ads

⬛ TREND DETECTION (OBJECTIVE 2)

i. No major seasonal spikes - Plan steady supply & marketing

ii. Clothing shows volatility - Consider redesign or re-positioning

iii. Use stable trends in Electronics & Home Goods for baseline forecasting

Recommendations

COMPETITOR PRICING (OBJECTIVE 3)

i. Price difference has minimal impact on volume

ii. Avoid aggressive discounting - focus on value, trust & brand

iii. Optimize pricing based on customer segment, not competition

OPERATIONAL FACTORS (OBJECTIVE 4)

i. Inventory levels & weather have no meaningful influence

ii. Ads show no short-term lift - Reassess strategy (creative, timing, audience)

iii. Invest in long-term perception-building over reactive tactics

AI Tool Disclosure & Links

Used ChatGPT for:

- Structuring Python code (EDA, plots, correlations)

- Insight framing

- Report and PPT organization

- All final decisions, interpretations, and strategy directions reflect my original thought process and judgment.

Links:

- [Google Drive](#)

 (This Link Consist Google Collab Python Code & Report of the Case Study)

- [Tableau Dashboard](#)