

Project Analysis Details:

Segmenting Promo Code Impact by Gender: A/B Testing Insights

Client Request

The marketing team at RetailX, an online retail company, approached the Data Analytics Department to optimize their promotional strategy through segmentation. They requested an analysis to determine: **"How does a 10% discount promo code affect customer spending across gender segments?"** Specifically, they wanted to understand if the promo code's impact on average order value (AOV) differed between Male and Female customers, with the goal of tailoring future campaigns to the most responsive segment. The client asked for a statistically robust analysis with visualizations and actionable insights, delivered within a two-week timeframe to inform their Q2 marketing budget allocation.

Steps to Complete the Work

1. Data Collection and Preparation:

- ✓ Received a simulated dataset (simulated_experiment_data.csv) with 425 customer records, including Customer_ID, Group (Control/Treatment), Promo_Code_Applied, Order_Value, and Gender ('M'/'F').
- ✓ Verified data integrity, confirming no missing values and consistent Gender coding.

2. Exploratory Data Analysis (EDA):

- ✓ Computed summary statistics and group sizes (90 Treatment, 335 Control), segmented by Gender. Assessed data assumptions (normality via Shapiro-Wilk, variance homogeneity via Levene's test).
- ✓ Created faceted histograms, boxplots, and violin plots to visualize AOV distributions across Gender and Group, revealing potential differences in promo code response.

3. Statistical Testing:

- ✓ Segmented data into Male and Female subgroups and tested assumptions: Levene's (Male $p=0.6966$, Female $p=0.8553$) for equal variances and Shapiro-Wilk (all $p>0.05$) for normality.

- ✓ Conducted t-tests (Male: $p=0.0890$, Female: $p=0.0066$), bootstrapping (Male CI: -0.33 – 5.33 , Female CI: 1.53 – 8.32), and calculated Cohen's d (Male: 0.2614 , Female: 0.5279).

4. Interpretation and Reporting:

- ✓ Compiled results into a formatted table, showing a \$2.51 AOV lift for Males (non-significant) and a \$5.00 lift for Females (significant). Drafted insights, interpretations, and business recommendations.

Feedback Rounds

The project underwent **two rounds of feedback** with the marketing team:

- ✓ **Round 1:** Presented initial t-test results and boxplots. The client requested segmentation by Gender (previously unsegmented) and additional visualizations (violin plots) to better understand distributions. I also added segmentation, bootstrapping for robustness, and the violin plot.
- ✓ **Round 2:** Shared updated analysis with bootstrapped CIs and effect sizes. The client asked for a clearer table layout and a stronger focus on actionable insights. We implemented tabulate for the table and refined recommendations to prioritize Female targeting.

Time to Complete the Work

The project was completed in **8 business days**, broken down as follows:

- **Day 1–2:** Data sources collection, cleaning, and initial EDA (2 days).
- **Day 3–4:** Statistical testing (t-test, assumption checks) and visualization development (2 days).
- **Day 5–6:** Drafting initial report and incorporating Round 1 feedback (2 days).
- **Day 7:** Adding effect size, confidence intervals, and addressing Round 2 feedback (1 day).
- **Day 8:** Final review, title refinement, and delivery to the team (1 day).

Pricing

As an employee at an International Consultancy Firm based in Chile working remotely for RetailX, a larger retail company in the USA, I was compensated through a fixed monthly wage, with no direct project-specific billing to the client.