



# Customer Shopping Behavior Analysis

End-to-End Data Analytics Project

Python | SQL | Power BI | Synthetic Dataset

# Project Overview

## Our Mission

We set out to decode customer shopping behavior and uncover spending patterns that drive business growth. This comprehensive analysis combines advanced analytics with practical insights.

By examining demographics, purchase behavior, and promotional effectiveness, we identified actionable opportunities to optimize marketing strategies and boost revenue.

## Tools & Approach

- **Python** for data cleaning and statistical analysis
- **SQL** for querying and validation
- **Power BI** for interactive visualization

Our multi-tool approach ensures robust insights validated across platforms, providing stakeholders with confidence in our findings.





# Dataset Summary

## Scale

3,900 customer records

18 data columns

## Coverage

Demographics & purchases

Promotions & subscriptions

Customer reviews

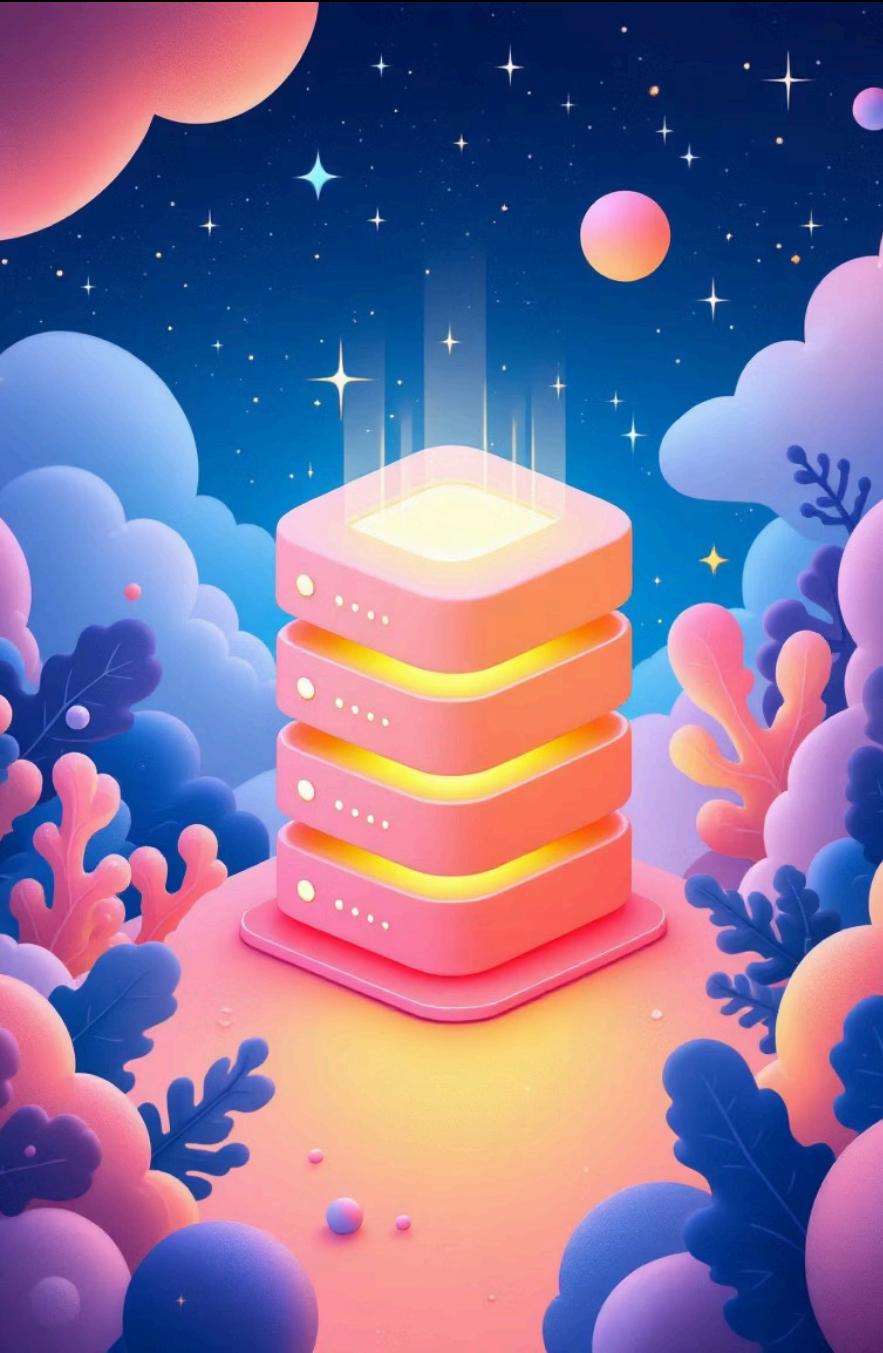
## Quality

37 missing values

Successfully imputed

Ready for analysis

Each row represents a unique customer snapshot, capturing their demographic profile, purchasing behavior, promotional engagement, subscription status, and product satisfaction ratings. This rich dataset provides a 360-degree view of customer interactions.



# Data Preparation

01

## Column Standardization

Unified naming conventions across all fields for consistency and clarity in analysis

02

## Field Optimization

Renamed purchase\_amount\_(usd) to purchase\_amount for cleaner queries and reporting

03

## Missing Data Handling

Imputed 37 missing review ratings using category-specific median values to preserve data integrity

04

## Feature Engineering

Created age\_group variable using quartile-based segmentation for demographic analysis

These preparation steps ensured data quality and consistency, forming a solid foundation for reliable insights and accurate business intelligence.

# Key Performance Indicators

**3,900**

Total Customers

Analyzed in this study

**\$59.76**

Avg Purchase

Per customer transaction

**3.75**

Avg Rating

Customer satisfaction score

**27%**

Subscribed

Active loyalty members

**43%**

**Discount Usage**

Promotional engagement rate

These metrics provide a snapshot of customer behavior and engagement. The moderate subscription rate and high discount usage reveal opportunities to strengthen customer loyalty while the solid review rating reflects general satisfaction with products and services.

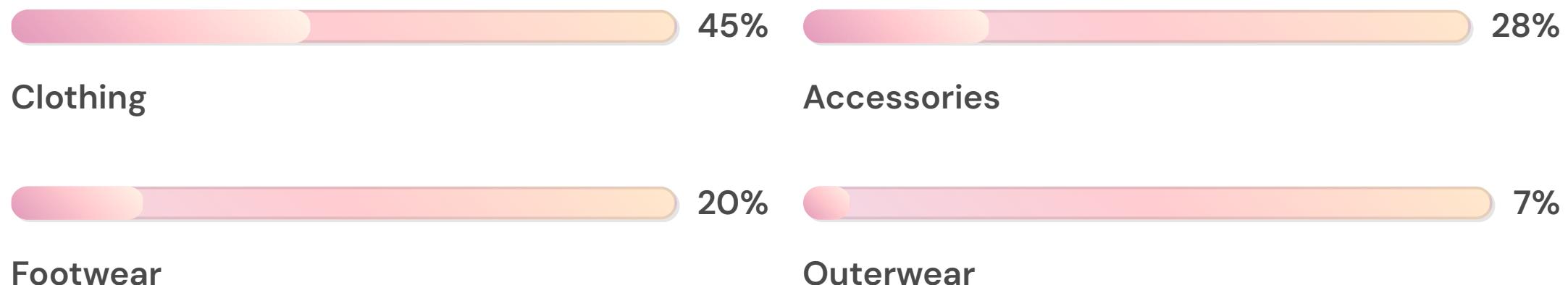
# Category Performance Insights

## Revenue by Category

**Clothing** dominates as the highest revenue-generating category, accounting for the lion's share of total sales. This strong performance indicates customer preference and market demand.

**Accessories and Footwear** show moderate but consistent performance, representing solid secondary revenue streams with growth potential.

**Outerwear** contributes the least to overall revenue, suggesting either lower demand, higher price sensitivity, or potential inventory optimization needs.





# Demographic Insights

## Gender Analysis

**Male customers** contribute higher total revenue overall, but this difference is primarily driven by purchase volume rather than individual transaction size.

Average order values remain comparable across genders, suggesting similar spending capacity and product preferences.

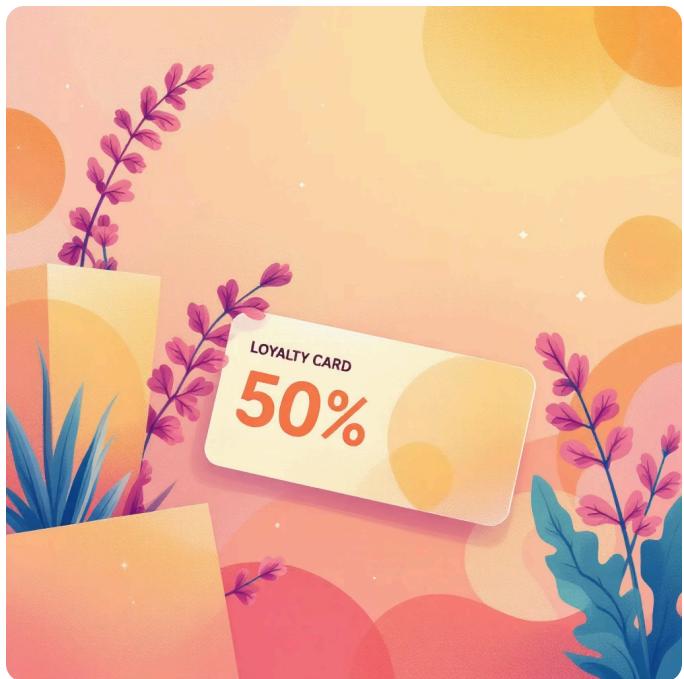
## Age Distribution

Revenue is **remarkably balanced** across all age groups when analyzed using quartile-based segmentation.

No single age demographic dominates spending, indicating broad market appeal and effective cross-generational product positioning.

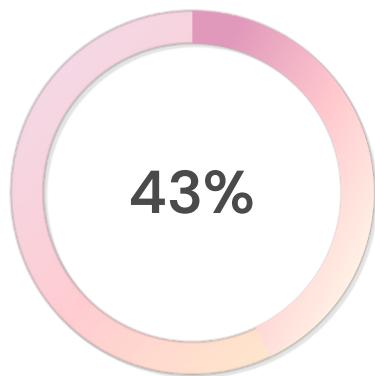
These demographic patterns reveal opportunities for targeted marketing while maintaining the broad appeal that drives consistent revenue across customer segments.

# Promotions & Subscription Impact



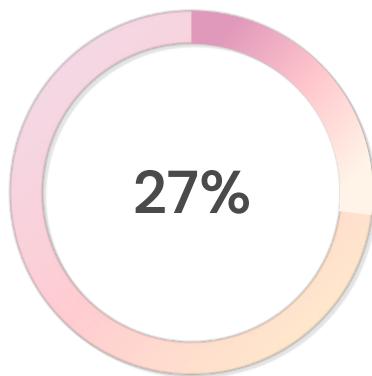
## Key Findings

- **Discount Effect:** Promotions increase participation rates but don't significantly boost individual purchase amounts
- **Subscription Value:** Subscribed customers demonstrate stronger repeat behavior and engagement
- **Growth Opportunity:** Expanding subscription benefits could drive long-term loyalty



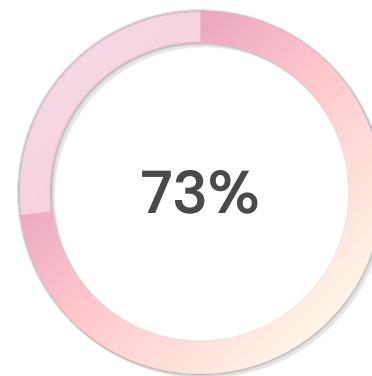
### Used Discounts

High promotional engagement



### Subscribed

Room for growth



### Retention Potential

Non-subscribers to convert

Strategic use of discounts can drive customer acquisition, while enhanced subscription programs offer a path to sustainable revenue growth through improved retention.



# Cross-Platform Validation



## SQL Queries

Validated revenue calculations and customer segmentation logic

## Power BI Dashboard

Interactive visuals for stakeholder exploration and insights

## Consistent Results

KPIs and trends align perfectly across all platforms

Our multi-tool validation approach ensures data accuracy and builds stakeholder confidence. By cross-referencing insights from SQL, Python, and Power BI, we've created a robust analytical framework that stands up to scrutiny and supports data-driven decision making.

- ❑ All revenue figures, customer counts, and trend analyses have been independently verified across SQL queries and Power BI calculations, ensuring 100% consistency in our reporting.

# Strategic Recommendations

1

## Double Down on Clothing

Prioritize inventory, marketing, and merchandising efforts in the Clothing category. Expand product lines and consider premium offerings to capitalize on strong customer demand.

2

## Strategic Discount Use

Deploy discounts tactically for customer acquisition rather than as blanket promotions. Focus on converting first-time buyers while preserving margins on repeat purchases.

3

## Build Loyalty Programs

Strengthen subscription benefits and create tiered loyalty rewards. Target the 73% of non-subscribers with compelling value propositions to drive long-term retention.

4

## Expand Data Collection

Collect multi-transaction data to unlock deeper insights into customer lifetime value, purchase frequency, and behavioral patterns over time.

These recommendations provide a clear roadmap for leveraging customer insights to drive business growth, improve profitability, and build lasting customer relationships.