



Customer Shopping Behavior Analysis

An End-to-End Data Analytics Project

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PYTHON (PANDAS)

POSTGRESQL

SQL

INTERACTIVE DASHBOARD

Project Overview

Uncovering Customer Insights

This project analyzes customer shopping behavior from raw data to actionable insights.

1

How do customers shop?

Understanding purchasing patterns.

2

Who spends more?

Identifying high-value segments.

3

Do discounts increase revenue?

Evaluating promotional effectiveness.

Project Goals

Key questions driving our analysis:



Understand Customer Purchasing Behavior

Deep dive into habits and preferences.



Identify High-Value Customer Segments

Focus on profitable customer groups.



Measure Impact of Discounts & Subscriptions

Quantify promotional effectiveness.



Analyze Product Performance & Satisfaction

Evaluate product success and customer feedback.



Present Interactive Insights

Dashboard for easy decision-making.

Dataset Understanding

A comprehensive view of customer interactions.

Customer Demographics

Age, Gender

Purchase Behavior

Amount, Frequency

Product Details

Category, Item Purchased

Discount & Promotion

Usage data

Shipping Type

Standard, Express, etc.

Customer Review Ratings

Feedback on products

Previous Purchase History

Loyalty indicators

Combined Data

For behavioral and financial insights.



Data Preparation & Feature Engineering (Python)

Transforming raw data into meaningful insights.

Initial Exploration

Structure, missing values, summary statistics.

Data Standardization

Lowercase column names, underscore spaces, clear labeling.

Handling Missing Values

Median imputation for review ratings within categories.

Feature Engineering

Age group segmentation, numeric purchase frequency, discount optimization.



Database Integration (PostgreSQL)

Storing and managing data for efficient analysis.

Database: **customer_behavior**

Structured environment for our data.

Table: **customer**

Cleaned and prepared data loaded here.

Benefits

- Fast querying for rapid insights.
- Advanced SQL capabilities (CTEs, window functions).
- Seamless dashboard integration.

Business Questions & SQL Insights

Answering critical business questions with data-driven queries.



Q1: Male vs. Female Revenue

Target gender-based marketing strategies.



Q2: Discount User Spending

Identify high-value customers even with discounts.



Q3: Product Satisfaction

Based on average review ratings.



Q4: Shipping Type & Spending

Compare average purchase for Standard vs. Express.



Q5: Subscriber Spending

Evaluate financial value of subscription programs.

Q6: Product Discount Dependency

Optimize discount strategies for specific products.

Advanced SQL Insights

Deeper analysis into customer behavior and product performance.



Q7: Customer Segmentation by Loyalty

New, Returning, Loyal.
Understand lifecycle and retention.



Q8: Top 3 Best-Selling Products

Identifies category leaders using window functions.



Q9: Repeat Buyers & Subscriptions

Connects customer loyalty with subscription behavior.



Q10: Age Group Revenue Contribution

Revenue share and percentage contribution by age group.

Key Insights & Business Impact

Transforming data into strategic actions.



✨ Key Observations:

- Certain age groups drive significant revenue.
- Subscribers generally spend more.
- Loyal customers generate strong revenue.
- Discounts drive volume, not always value.
- Express shipping correlates with higher spending.

📈 Business Impact:

- Improve targeted marketing campaigns.
- Optimize discount strategies.
- Enhance customer retention programs.
- Identify high-performing products.
- Make data-driven pricing & shipping decisions.

This project demonstrates a complete data analytics workflow, showcasing strong analytical, technical, and business-thinking skills.