

# Retail Sales Analytics Report

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## Title Page

### Retail Sales Analytics

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## 1. Introduction

Retail sales data analysis plays a crucial role in understanding customer behavior, optimizing inventory, and maximizing revenue. By analyzing sales trends, businesses can make data-driven decisions to enhance their marketing strategies and operational efficiency. This report presents an in-depth analysis of a retail sales dataset using Power BI, with a focus on uncovering customer purchasing patterns, sales trends, and product performance.

## 2. Executive Summary

This project presents a detailed retail sales analysis conducted using Power BI, aimed at uncovering customer purchasing patterns, pricing behavior, and product performance across three core categories: Electronics, Clothing, and Beauty. The dataset, comprising 1,000 transactions over a two-year span, was cleaned, modeled, and visualized to extract actionable insights that can drive strategic business decisions.

Key findings revealed that **Electronics generated the highest revenue**, with premium-priced items—especially those priced at \$500—accounting for over **50% of total sales**. The average order value was \$456, with bulk purchases of 3–4 items per transaction being common. Demographic analysis showed that customers aged **19–28 were the most profitable**, with females dominating spend in Clothing and Beauty, and males in Electronics. Seasonal trends highlighted **Q4 and weekends** (especially Saturdays) as peak revenue periods.

These insights led to strategic recommendations, including inventory prioritization for high-performing segments, gender-targeted marketing, and optimization of weekend promotional efforts. This project demonstrates my ability to leverage data visualization, storytelling, and business acumen to deliver value-driven insights using Power BI.

## 3. Project Objectives

The key objectives of this analysis are to:

- **Analyze customer behavior** based on age and gender to understand purchasing patterns.
- **Identify sales trends** across different time periods (daily, monthly, seasonal).
- **Evaluate product category performance** to determine which items are most popular.
- **Explore relationships** between customer age, spending levels, and product preferences.

- **Examine seasonal shopping habits** and how they affect purchasing behavior.
- **Assess transaction size** to identify patterns in quantity purchased per visit.
- **Investigate pricing distributions** within each product category to uncover pricing strategies or outliers.

Ultimately, the goal is to generate data-driven insights that inform inventory planning, marketing, and overall business strategy.

## 4. Dataset Overview

### 4.1 Data Source

The dataset was obtained from Kaggle.com and provided in Excel format. It consists of transactional records capturing various aspects of retail sales with a total of 1,000 rows and 9 columns.

### 4.2 Key Fields

I reviewed the dataset to understand its structure, and identified the following key variables:

- **Transaction ID** – A unique identifier for each transaction, allowing tracking and reference.
- **Date** – The date when the transaction occurred, providing insights into sales trends over time.
- **Customer ID** – A unique identifier for each customer, enabling customer-centric analysis.
- **Gender** – The gender of the customer (Male/Female), offering insights into gender-based purchasing patterns.
- **Age** – The age of the customer, facilitating segmentation and exploration of age-related influences.
- **Product Category** – The category of the purchased product (e.g., Electronics, Clothing, Beauty), helping understand product preferences.
- **Quantity** – The number of units of the product purchased, contributing to insights on purchase volumes.
- **Price per Unit** – The price of one unit of the product, aiding in calculations related to total spending.
- **Total Amount** – The total monetary value of the transaction, showcasing the financial impact of each purchase.

## 5. Tools & Technologies Used

This project utilized a combination of data analysis and visualization tools to ensure accurate insights and an effective presentation:

- **Power BI**  
Used for building interactive dashboards, creating DAX measures, and visualizing sales trends, customer demographics, and product performance.
- **Microsoft Excel**  
Used for initial data exploration, cleaning, and transformation prior to importing into Power BI. Key tasks included handling missing values, formatting columns, and creating derived fields.
- **DAX (Data Analysis Expressions)**  
Employed within Power BI to create calculated columns, measures, and KPIs such as total sales, age group segmentation, sales by weekday, and top-performing product categories.
- **Kaggle**  
Source of the retail sales dataset used for analysis. Kaggle provided a clean, structured dataset suitable for exploring consumer purchasing patterns.

## 6. Data Cleaning & Transformation

To ensure accuracy and consistency in analysis, the following data cleaning steps were undertaken:

- Checked for blanks and duplicate entries to maintain data integrity.
- Addressed missing values in key columns such as Product Category and Total Amount.
- Standardized date formats for improved time series analysis.
- Ensured consistency in product names and categories to avoid discrepancies.

To further enhance my analysis and derive valuable insights, some data transformation processes were implemented:

- Ensured the appropriate data types were fixed. e.g, Text for transaction ID and gender, while whole number was used for age and quantity.
- Added a new column for age group. This was used to classify the customer age.
- Simplified the initial date column into year and weekday type.

## 7. Analysis & Insights

Through detailed exploratory data analysis, the following key insights were uncovered:

## Total Sales Overview

- The dataset spans two years, with the majority of transactions recorded in 2023 (January to December), totaling **\$454K** in sales.
- Sales in **2024** are limited to **January**, amounting to **\$2K**, primarily driven by **male** customers purchasing beauty products on workdays.

## Customer Demographics & Purchasing Behavior

- Gender-based analysis revealed nearly equal spending patterns: females accounted for 51.06% of total sales, while males contributed 48.94%.
- The average customer age was 41 years, with the highest volume of sales from customers aged 19–38, highlighting a key target demographic.
- Further analysis of gender-specific product preferences showed:
  - **Females** spent more on **beauty** and **clothing**:
    - Beauty: **\$74,830**
    - Clothing: **\$81,275**
    - Electronics: **\$76,735**
  - **Males** showed a stronger preference for **electronics**:
    - Beauty: **\$68,685**
    - Clothing: **\$74,305**
    - Electronics: **\$80,170**

## Sales Trends Over Time

- Sales performance varied across quarters:
  - **Q4** had the highest revenue: **\$126.19K**
  - **Q3** experienced a dip: **\$96.06K**
- Sales by day of the week showed that:
  - **Tuesday** recorded the highest number of transactions (**161**) and units sold (**397**).
  - **Saturday** generated the highest total sales value (**\$78,815**), largely driven by electronics purchases across multiple age groups.

- Product category-specific seasonal trends:
  - **Beauty** peaked in Q1 (\$38,510) and Q4 (\$37,455)
  - **Clothing** peaked in Q1 (\$42,750) and Q4 (\$40,585)
  - **Electronics** peaked in Q2 (\$46,820) and Q4 (\$48,150)

### Product Category Preferences

- **Electronics** (34.41%) and **Clothing** (34.12%) were the most purchased categories by sales value.
- A deeper dive into **sales by price per unit** showed that **high-value electronics** contributed the highest volume of sales.

### Purchase Behavior & Transaction Volume

- The dataset includes 1,000 transactions and 2,514 total units sold, reflecting bulk purchasing behavior.
- The average quantity per order was 2.51 units, suggesting that customers often bought more than one item per transaction.
- The average order value stood at \$456, aligning with the popularity of high-value products, especially electronics.
- Customers who bought:
  - **3 units** per transaction contributed **31.64%** of total revenue.
  - **4 units** per transaction contributed **40.76%**, underscoring the value of multi-unit purchases.

### Relationship Between Sales, Age Range, and Product Preference

- While the average customer was 41 years old, most sales were driven by the 19–28 age group. The 0–18 age group generated the lowest sales.
- Age group product preferences:
  - **0–18 & 39–48 years** preferred **beauty products**.
  - **19–28 years** favored **clothing**.
  - **29–38, 49–58, and above 58** leaned toward **electronics**.

### Product Pricing Distribution

- Products were priced at **\$25, \$30, \$50, \$300, and \$500**. Corresponding sales values were:
  - **\$25** – \$13,050
  - **\$30** – \$13,350
  - **\$50** – \$26,700
  - **\$300** – \$155,400
  - **\$500** – \$247,500
- Customers overwhelmingly preferred premium-priced products, particularly those at \$500, which generated the highest revenue.
- Lower-priced products (under \$50) likely corresponded to beauty and clothing, while electronics dominated the \$300–\$500 range.

Key Insights Summary Table

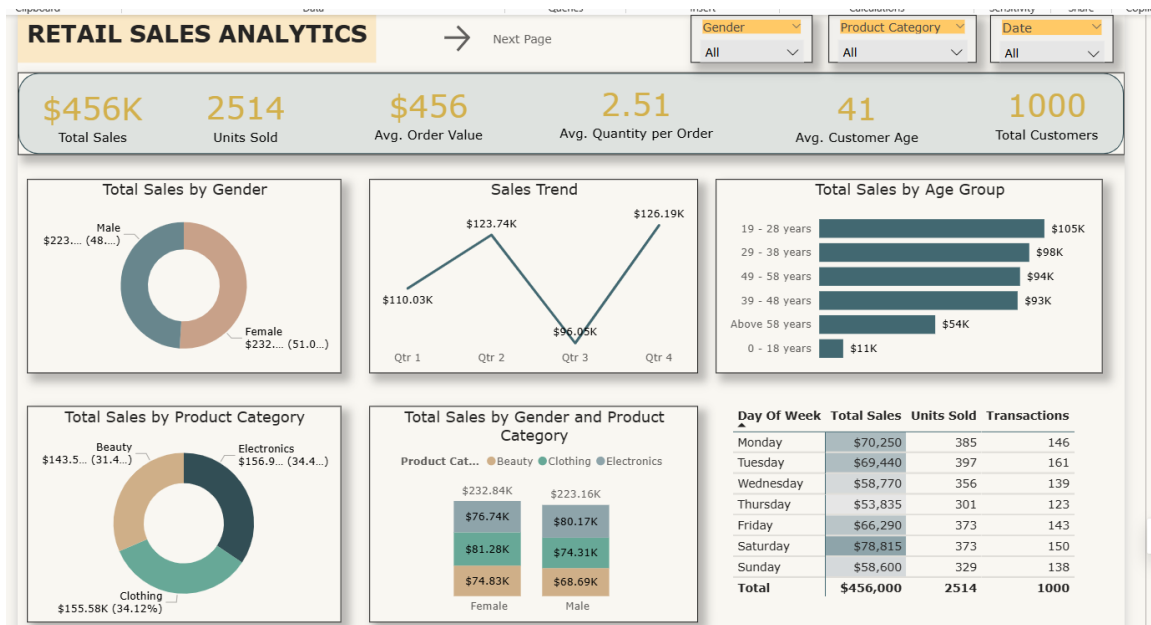
Insights	Detail
Total Sales	\$456,123
Units Sold	2,514 units
Top Category	Electronics - \$155k
Best Age Group	19-28 years old
Top Day for Sales	Saturday
Most Profitable Quarter	Q4 (Oct-Dec)
Optimal Price Point	Around \$500
Gender Spending Trend	Females spent slightly more overall

## 8. Visualization & Dashboard

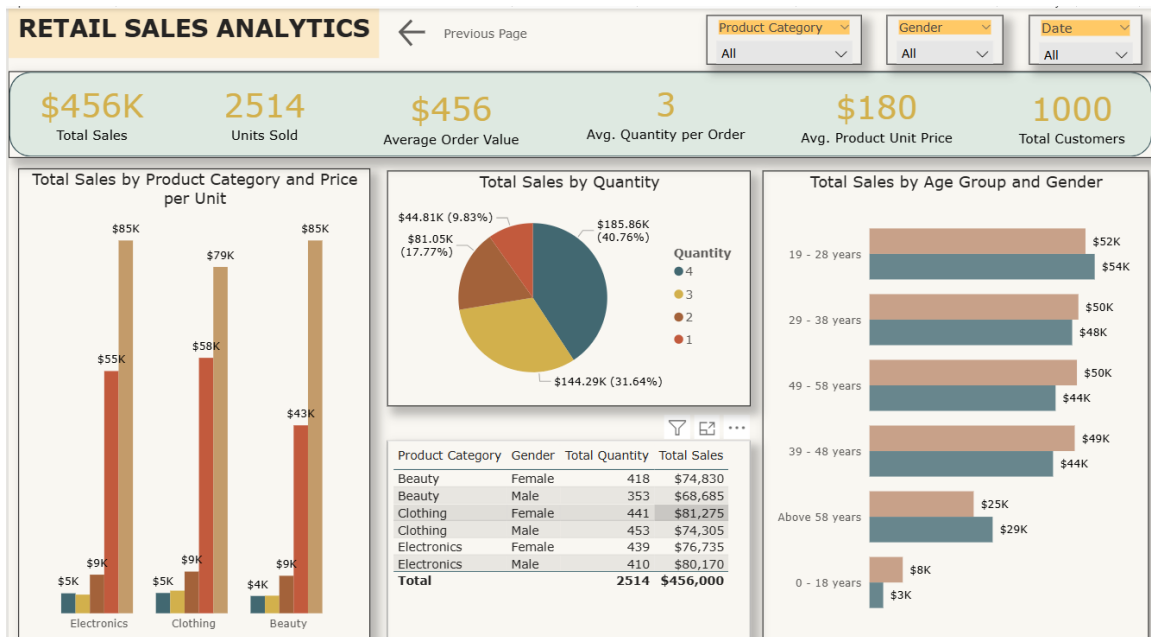
The Power BI dashboard was designed with interactive visuals and filters to explore the data dynamically. Key components of the dashboard include:

- **Sales by Age Group:** Visualizing revenue distribution across age ranges
- **Category Performance:** Highlighting top product categories by revenue and quantity
- **Sales Trend by Date:** Revealing time-based patterns and seasonality
- **Sales by Gender:** Comparing total revenue and purchase behavior
- **Price Point Performance:** Showing which price ranges drove the most revenue
- **Sales by Day of the Week:** Identifying the most profitable days

Users can filter the dashboard by **gender**, **product category**, **age group**, and **time period** to gain more targeted insights.



*Retail Sales Analytics Dashboard 1.*



*Retail Sales Analytics Dashboard 2.*

## 9. Business Recommendations

### 1. Optimize Inventory Based on Seasonal Demand



- Since Q4 recorded the highest sales across most product categories, the business should stock up on popular products ahead of this period.
- Beauty products should be prioritized in Q1 and Q4, while Electronics should have more inventory in Q2 and Q4.

## **2. Leverage High-Performing Customer Demographics**

- The 19-28 age group contributed the highest sales. Targeted marketing campaigns, loyalty programs, and personalized offers should focus on this age range.
- Since males buy more electronics and females prefer beauty and clothing, gender-based product recommendations can enhance the shopping experience.

## **3. Adjust Pricing Strategies to Maximize Revenue**

- Products priced at \$500 generated the highest sales, indicating strong customer preference for higher-priced items. Introducing premium product lines or bundle deals around this price point could boost revenue.
- Consider offering tiered pricing models to attract different customer segments.

## **4. Capitalize on Workday Shopping Trends and Weekend Sales Boost**

- Sales were significantly higher on workdays than weekends. The business can take advantage of this by running midweek promotions or special discounts to further boost weekday sales.
- Implement targeted advertising campaigns on workdays when customer engagement is highest.
- Lower sales on weekends suggest an opportunity to run promotions or discounts during weekdays to further boost revenue.

## **5. Expand Product Offerings and Diversify Marketing Channels**

- Since Electronics, Clothing, and Beauty are performing well, consider expanding these categories by introducing complementary products (e.g., accessories for electronics, premium beauty products, or seasonal clothing lines).
- Use digital marketing strategies such as influencer partnerships, email marketing, and social media ads to reach potential customers effectively.

## **6. Improve Customer Retention and Personalization**

- Implement a loyalty program that rewards frequent buyers, particularly in high-performing age groups.
- Use personalized recommendations based on purchase history to encourage repeat purchases and enhance customer experience.

## 10. Conclusion

The analysis of the retail sales data has uncovered key insights into customer purchasing patterns, product preferences, and sales trends. The data reveals a strong customer inclination towards premium-priced items, especially during workdays, highlighting the impact of both price and timing on purchasing behavior. Gender-based preferences also play a significant role, with distinct trends in product selection between male and female customers. Additionally, product categories such as Electronics and Groceries consistently outperformed others, contributing significantly to overall revenue.

These insights provide a solid foundation for data-driven decision-making, allowing the business to optimize inventory, tailor marketing efforts, and improve pricing strategies to better meet customer demand and maximize profitability.

## 11. Limitations

- The dataset consists of only 1,000 transactions, which may not represent a large-scale retail environment.
- Sales data from 2024 covers only January, limiting year-over-year comparison.
- Customer location, income level, and product brand information were not available, which restricted deeper segmentation.
- The data did not include returns, discounts, or promotional impacts.