**E-Commerce Retail Analysis Report**

# 1. Dataset Description

* **Source:** Synthetic e-commerce retail dataset (1,000 transactions).
* **Columns:**  
  - customer\_id – Unique identifier  
  - order\_date – Order date (transaction timestamp)  
  - product\_id, product\_name – Product details  
  - category\_id, category\_name – Product category info  
  - quantity, price – Purchase quantity and unit price  
  - payment\_method – Mode of payment (Credit Card, COD, Bank Transfer, etc.)  
  - city – Customer location  
  - review\_score – Customer satisfaction rating (1–5)  
  - gender, age – Demographics
* **Data Quality:**  
  - No missing values  
  - Clean and consistent structure  
  - Balanced mix of demographics, product types, and geographic spread

# 2. Operations Performed

* **Data Cleaning & Exploration:**- Ensured correct data types (date, integer, double).  
  - Added order\_value column = quantity × price.  
  - Checked categorical distributions (gender, category, city, payment method).
* **Descriptive Analytics:**- Age group & gender distribution of sales (grouped bar chart).  
  - Day-of-week purchase activity (pie chart).  
  - Average order value (numeric summary).  
  - Top 5 products & categories by revenue (bar/donut charts).  
  - Review score distribution (histogram).  
  - Payment preferences (horizontal bar chart).  
  - Top 5 cities by revenue (line chart).
* **Relationship Analysis:**- Age group vs. spending patterns.  
  - Category vs. revenue comparison.  
  - Payment method preferences across cities.  
  - Reviews vs. product categories (satisfaction trends).

# 3. Key Insights

* **Customer Demographics:**- Mid-aged customers (30–49 years) generate the highest revenue.  
  - Younger adults (20–29) shop more often but spend less per order.  
  - Gender-specific preferences observed: males dominate Electronics, females prefer Fashion & Home.
* **Sales Trends:**- Weekends show peak order activity.  
  - Average order value ≈ ₹300.  
  - Seasonal peaks during holiday months (Dec–Jan).
* **Product & Category Insights:**- Electronics dominates revenue (~40–50%).  
  - Top products: Smartphones, Tablets, Smartwatches.  
  - Fashion/Books drive order counts but contribute less to total revenue.
* **Review Trends:**- 70%+ of reviews are 4–5 stars → strong satisfaction.  
  - Negative reviews (1–2 stars) tied to logistics/delivery delays.
* **Payment & Geographic Spread:**- Credit Card most preferred, followed by Bank Transfer.  
  - COD significant (20–25%), especially in Tier-2/3 cities.  
  - Top revenue cities: New Oliviaberg, Elizabethmouth (metros).

# 4. Recommendations

* **Customer Segmentation:**- Personalize campaigns for mid-aged spenders (30–49).  
  - Encourage younger customers with discounts and bundles.  
  - Launch gender-specific promotions (e.g., Electronics for males, Lifestyle for females).
* **Marketing & Sales Strategy:**- Run weekday flash sales to balance traffic.  
  - Use bundling strategies to raise AOV (combine electronics with accessories/books).  
  - Push holiday season campaigns early to capture demand spikes.
* **Payment Optimization:**- Promote digital payments (cashback offers, EMI schemes).  
  - Keep COD available in smaller towns to retain inclusivity.
* **Operations & Logistics:**- Improve delivery efficiency to reduce low review scores.  
  - Stock up on top categories (Electronics, Sports & Outdoors) during festive peaks.
* **Future Analytics Opportunities:**- Predictive modeling for churn and customer lifetime value.  
  - Recommendation system for cross-selling.  
  - Geographic demand forecasting for better inventory planning.