Customer Data Analysis using Power BI

1. Project Overview

This project aims to analyze customer shopping behavior using Power BI. This project focuses on understanding customer purchasing behavior across multiple shopping malls between 2021–2023 using Power BI. The analysis aims to identify key revenue drivers, customer demographics, payment preferences, and category performance to support data-driven business decisions.

2. Objectives

- Identify which gender and age group drive the most sales and revenue.
- Determine top-performing product categories and their contribution to total revenue.
- Analyze payment method trends and their relationship with other business factors.
- Study revenue distribution by location (shopping malls) to find consistent business patterns.

3. Dataset Details

Dataset Name: Customer Data
Number of Records: 99,457 rows

The dataset includes 10 shopping malls, with variables such as invoice number, customer ID, gender, age, product category, quantity, price, payment method, order date, and shopping mall locations. It represents real-world customer transactions from Istanbul, Turkey.

Column Name	Description	Data Type
Customer ID	Unique ID of each customer	Text
Gender	Male/Female	Text
Age	Age of customer	Integer
Product Category	Type of product purchased	Text
Quantity	Number of units purchased	Integer
Price	Price of one unit	Decimal
Invoice No	Unique reference code	Text
Payment Method	Mode of payment (Cash, Card, UPI)	Text
Invoice Date	Date of purchase	Date

4. Tools & Technologies

- **Power BI Desktop** – Dashboard creation and data visualization
- **Power Query** – Data validation and cleaning
- **DAX (Data Analysis Expressions)** – Calculated columns and custom measures
- **MySQL** – Data source connection
- **Excel/CSV** – For initial data inspection and validation

5. Project Workflow

1. Data Connection & Loading:

Data was extracted from a MySQL database and imported into Power BI Desktop, enabling interactive visualization and analysis of 99K+ records across 10 malls and multiple categories.

2. Data Validation & Cleaning

Checked for missing values, validated data types, and ensured consistency using Power Query.

3. Data Modeling & Calculations (DAX)

Created measures and calculated columns for revenue, quantity, and percentage insights using DAX.

1.Total Revenue
2. Total Quantity
3. Total Transactions
4. Quantity % by Gender
5. Revenue % by Gender
6. Age Category
7. Cumulative Percentage

4. Dashboard Design & Analysis:

Built interactive dashboards displaying trends in gender, age, payment, and category-based revenue for decision-making.

➢ Visualizations Used

- **Pie Chart**: Revenue distribution by Payment Method
- **Bar Chart**: Revenue by gender and age category
- **Column Chart**: Quantity by category, Revenue by gender and payment method
- **Hierarchy line chart**: Revenue trend analysis (2021-22), Quantity by age category
- **Donut Chart**: Revenue by Top shopping malls
- **Line and Clustered column chart**: Revenue and cumulative % by category

- **Card**: Total Revenue, Quantity by Male & Female, Highest Purchasing Age category
- **Slicer**: Age, Category, Shopping mall, Year, Month, Gender, Age Category

6. Key Insights

Gender Analysis

- Female customers purchase **59.8% of total items (179K)** and generate **150M revenue**, compared to 101M from males.
- Clothing category shows the largest gap — **Female: 68M vs Male: 46M**.
- Cash is the top revenue-generating method for both genders.

Age Analysis

- **56–69 age group** is the top contributor with **67M revenue and 80K units sold.**
- Revenue steadily rises with age; **Age 37** individually leads in both units and value.

Payment Analysis

- Cash dominates transactions across all demographics, indicating a universal preference.
- Credit Card ranks second with 35% of total revenue, while Debit Card is least used at 20%.

Category Analysis

- Top 3 categories — **Clothing (114M), Shoes (67M), Technology (58M)** — make up **95% of total revenue (251.5M)**.
- Clear disparity: Shoes & Tech = high-value/low-volume; Cosmetics & Food = low-value/high-volume.

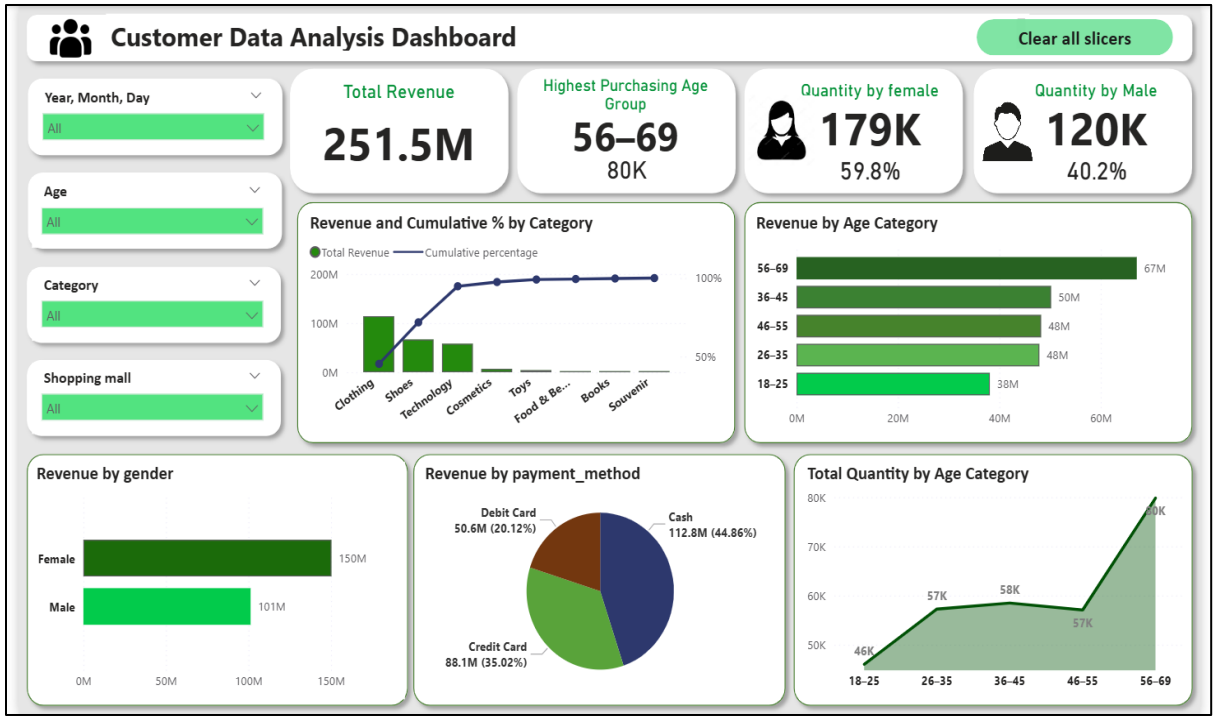
Shopping Mall Analysis

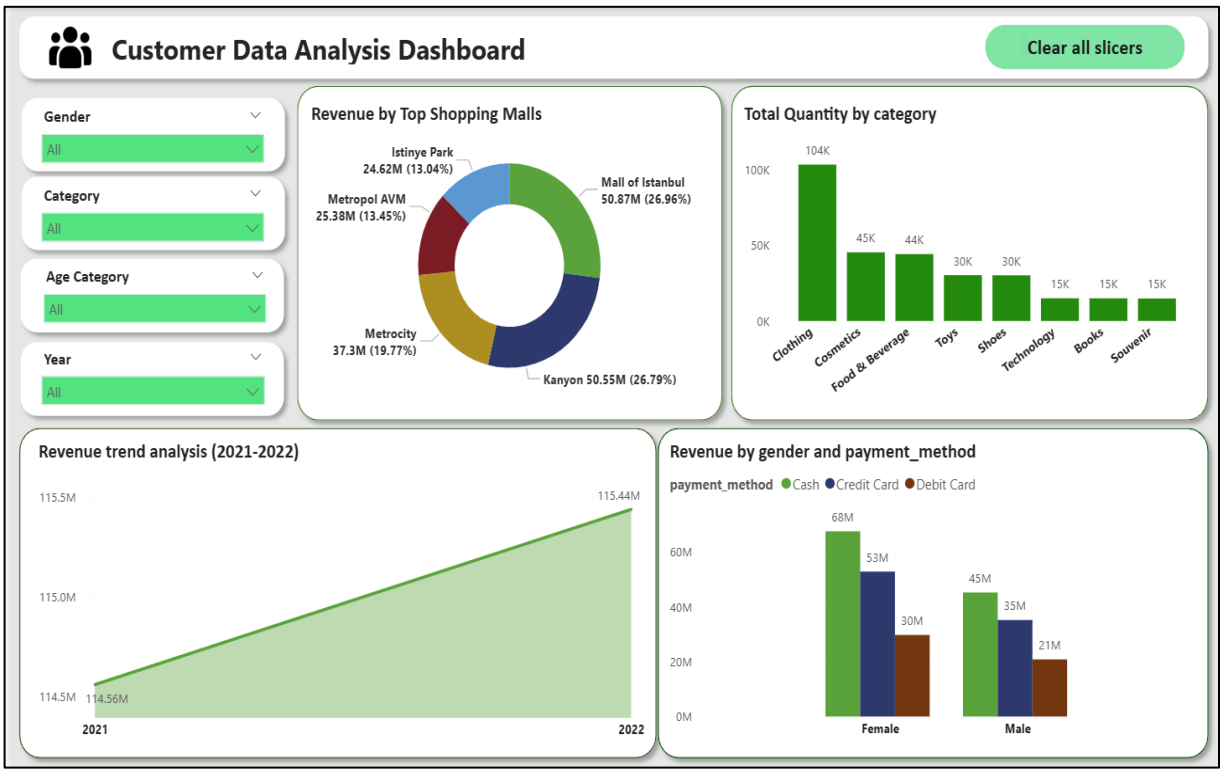
- Top malls — **Mall of Istanbul (50.87M)** and **Kanyon (50.55M)** — contribute ~54% of total revenue.
- Revenue distribution and top-category rankings are **consistent across all malls.**

Revenue Trend Analysis

- The 2023 data was excluded from the revenue analysis to preserve **data uniformity and temporal consistency**, as it represented only the first quarter and could bias the yearly trend interpretation. Revenue increased steadily between 2021–2022.
- Monthly peaks: **July (20.4M)** and **October (20.5M)**.
- Daily trend: Stable between 7.3M–7.8M, with small dips near month-end.

7.Dashboard Overview





8. Business Insights (360° Summary)

Perspective	Key Insight
Finance	95% of revenue concentrated in Clothing, Shoes, and Technology — requires risk control.
Sales & Operations	Cash (~45%) dominates; standardized sales processes essential.
Marketing	Female customers (56–69) are the most profitable segment.
Supply Chain	Focus inventory on top categories; reduce low-ASP stock.
Executive	Business is essentially a three-category enterprise.

9. Recommendations

- **Prioritize high-performing categories:** Optimize inventory and marketing for Clothing, Shoes, and Technology.
- **Loyalty for female customers:** Design retention programs for high-value segments.
- **Encourage digital payments:** Offer small rewards for credit/debit transactions to reduce cash handling.
- **Dynamic pricing:** Use real-time insights for pricing and seasonal promotions.
- **Continuous dashboard monitoring:** Enable data-driven strategy updates.

10. Conclusion

This Power BI analysis provided a comprehensive understanding of customer behavior across demographics, categories, and malls. The insights highlight the dominant customer segments, payment behaviors, and revenue trends, helping retail decision-makers allocate resources efficiently and improve profitability.