

# **Retail Sales Analysis & Business Intelligence Report**

## **Power BI Dashboard Project (2023–2025)**

**Author:** *Adem Toumi*

**Role:** *Data Analyst*

**Tool:** *Microsoft Power BI*

---

### **Executive Summary (Project Overview)**

This project is a complete **Business Intelligence (BI) and Data Analysis case study** built in **Microsoft Power BI**, focusing on retail sales performance over the years **2023, 2024, and 2025**.

The goal is to extract **actionable insights** from raw data to help business decision-makers improve sales, profitability, and customer retention.

The dataset contains over **5,000 transaction records**, covering multiple **regions, stores, product categories, and customer profiles**.

All data was sourced from **Kaggle** and then cleaned, modeled, and analyzed following **professional BI practices**.

The project simulates a real-world analytical workflow — including **data preparation, DAX measure creation, KPI design, and interactive dashboards** — to showcase professional analytical skills.

The final Power BI report contains **three dashboards**:

Dashboard	Purpose	Focus
<b>Sales Overview</b>	Evaluate company performance and growth trends.	Revenue, Profit, Growth Rate, Regional Drilldown.
<b>Product Insights</b>	Identify top and low-performing products.	Profitability, Cost Control, Product Portfolio.
<b>Customer Insights</b>	Understand customer behavior and loyalty.	Segmentation, Age, Gender, Spending Patterns.

This document summarizes every analytical step and the main insights derived from the dashboards.

---

## 1. Project Goals

The objectives of this project are:

1. **Understand sales trends** across years and regions to identify growth or decline patterns.
  2. **Analyze profitability** and discover products with strong or weak margins.
  3. **Segment customers** into groups (Loyal, Normal, New) based on spending and engagement.
  4. **Support strategic decision-making** with clear, data-backed KPIs and visual insights.
- 

## 2. Dataset Description

The dataset is a **retail sales dataset** obtained from Kaggle, containing four main tables:

Table	Description
<b>Customers</b>	CustomerID, First/Last Name, Birthdate, Gender, Region.
<b>Products</b>	ProductID, Category, Subcategory, UnitPrice, CostPrice.
<b>Stores</b>	StoreID, Store Name, City, Region.
<b>Transactions</b>	Date, CustomerID, ProductID, StoreID, Quantity, Discount.

It covers data from **January 2023 to June 2025**, representing multi-year transactional activity.

### Key Stats:

- **Rows:** ~5,000
- **Regions:** 4 major regions (each containing several stores).
- **Categories:** Multiple product types with defined category hierarchies.
- **Timeframe:** 2023–2025

---

## 3. Data Cleaning and Preparation

Performed in **Power Query** within Power BI:

1. **Date Formatting:** Fixed inconsistent date formats in the Transactions table.
2. **ID Standardization:** Removed letter prefixes (e.g., C001 → 001) and ensured proper relationships using the `separate` function.
3. **Data Validation:** Checked for duplicates and missing values in customer and product tables.
4. **Schema Creation:** Built a **Star Schema** model linking:

- Transactions (Fact table)
- Customers, Products, Stores, Calendar (Dimension tables)

**5. Calendar Table:** Created a dedicated date table using `CALENDARAUTO()` for time intelligence.

---

## **4. Data Modeling & DAX Measures**

### **Key DAX Calculations:**

<b>Measure</b>	<b>Formula</b>	<b>Purpose</b>
<b>Sales</b>	<code>SUMX(Transactions, Transactions[Quantity] * (1 - Transactions[Discount]) * RELATED(Products[UnitPrice]))</code>	Total revenue after discounts.
<b>Sales TY</b>	<code>CALCULATE([Sales], FILTER(ALL('Calendar'), YEAR('Calendar'[Date]) = YEAR(TODAY())))</code>	Sales for the current year.
<b>Sales LY</b>	<code>CALCULATE([Sales], FILTER(ALL('Calendar'), YEAR('Calendar'[Date]) = YEAR(TODAY()) - 1))</code>	Sales for the previous year.
<b>Cost</b>	<code>SUMX(Transactions, Transactions[Quantity] * RELATED(Products[CostPrice]))</code>	Total cost of sold products.
<b>Profit</b>	<code>[Sales] - [Cost]</code>	Gross profit.

Measure	Formula	Purpose
<b>Avg Profit per Product</b>	AVERAGEX (Products, Products[UnitPrice] - Products[CostPrice])	Average margin per product.
<b>Customer Age</b>	DATEDIFF (Customers[BirthDate], TODAY(), YEAR)	Age calculation.
<b>Customer Category</b>	<i>(using SWITCH + VAR logic)</i>	Segments customers into Loyal, Normal, and New.

### Hierarchies:

- **Region Hierarchy:** Region → City → Store
- **Product Hierarchy:** Category → Subcategory → Product

These hierarchies enable **drill-down functionality** across dashboards.

---



## 5.Dashboard 1: Sales Overview

### **Purpose:**

To monitor overall performance, compare growth between years, and identify key trends across regions and categories.

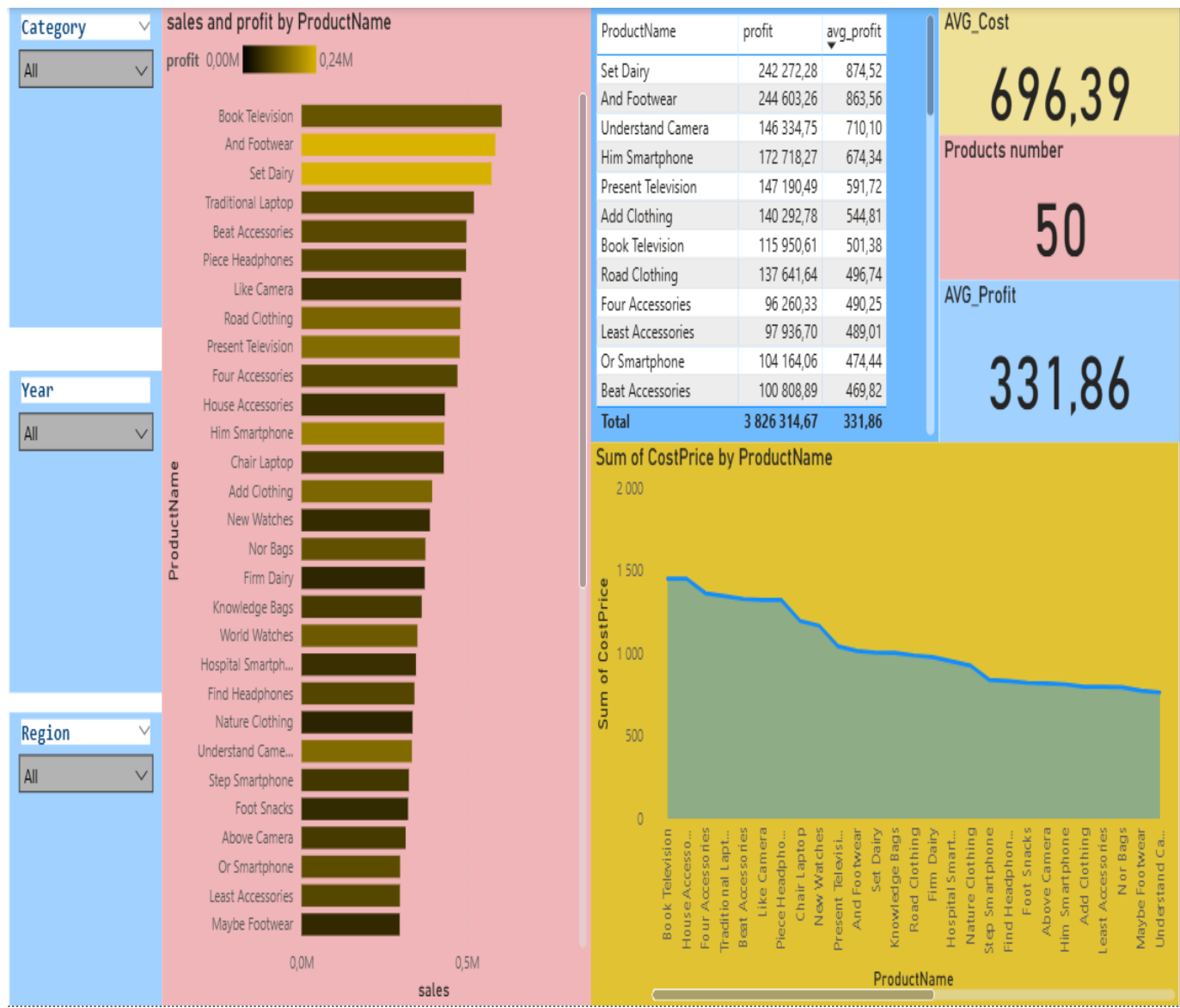
### **Visual Components:**

1. **KPI:** Growth % between This Year (TY) and Last Year (LY).

2. **Cards:** Total Profit & Total Sales.
3. **Line Chart:** Monthly Sales vs. Profit (to highlight seasonality).
4. **Clustered Column Chart:** Sales by Region and Year (with drilldown to Stores).
5. **Key Influencer Visual:** How CostPrice and UnitPrice affect Sales.
6. **Donut Chart:** Sales by Category → drilldown to Subcategory.
7. **Filters:** Year, Region, Category.

### **Analytical Insights:**

- **Growth:** -27.49% from last year, indicating a performance drop.
  - **Seasonality:** Clear peaks in Q4 (especially December).
  - **Regions:** The North and Central regions outperform others.
  - **Drivers:** Lower CostPrice and optimal UnitPrice directly increase sales volume.
  - **Category Trends:** Fashion and Grocery categories dominate total revenue.
-



## 6. Dashboard 2: Product Insights

**Purpose:**



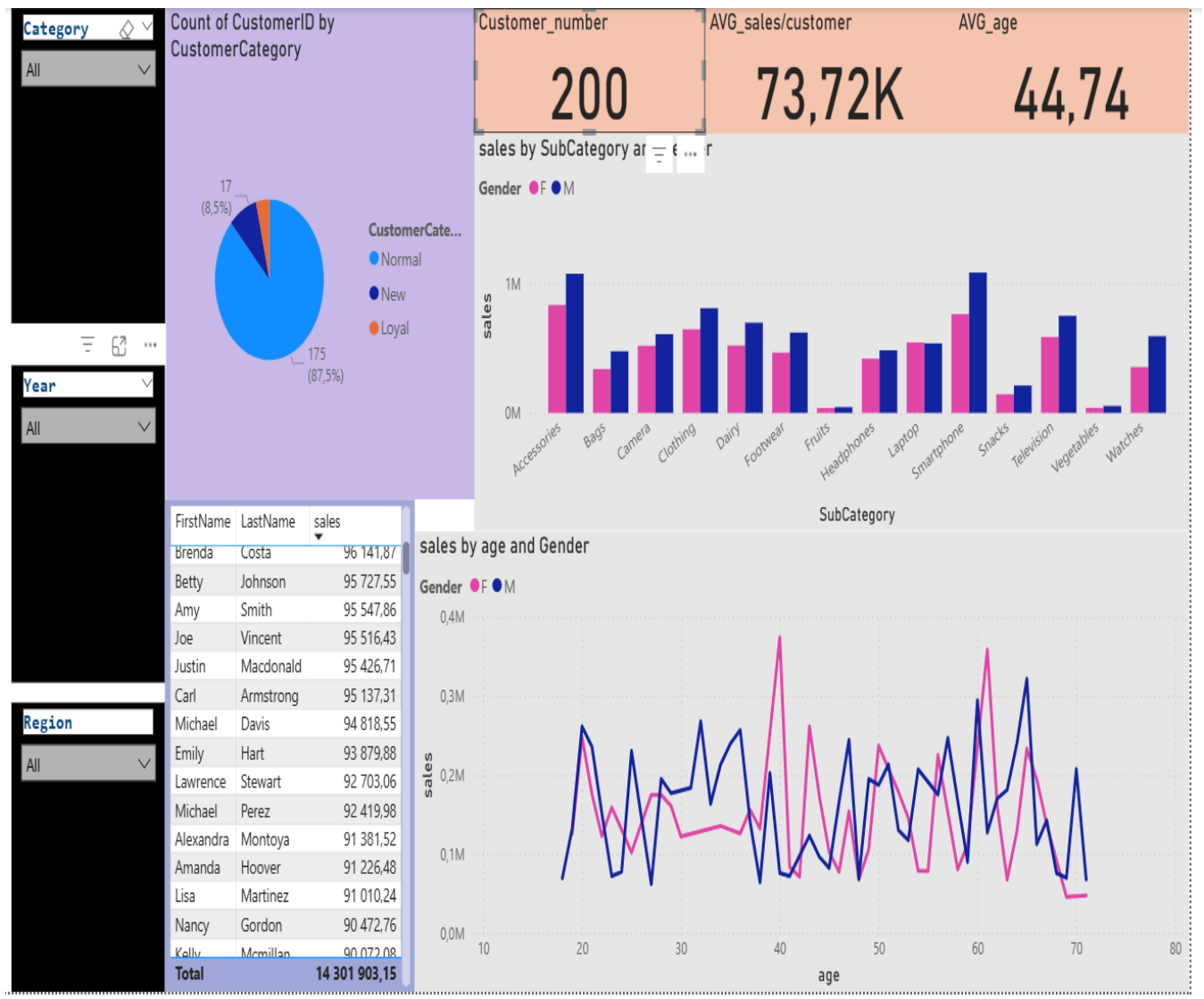
To analyze which products contribute the most to sales and profit, and identify cost inefficiencies.

### Visual Components:

1. **Clustered Bar Chart:** Sales by Product Name (sorted Z → A), with conditional formatting by Profit.
2. **Table:** Product Name | Total Profit | Profit.
3. **Cards:** Total Products, Average Cost, Average Profit.
4. **Stacked Area Chart:** Total Cost Price by Category → Drilldown to Subcategory.
5. **Filters:** Year, Category, Region.

### Analytical Insights:

- **Top Products:** A small group of products generates most revenue.
  - **Profitability:** Some high-selling items have thin profit margins — cost optimization required.
  - **Category Costs:** Fashion products have high cost ratios; Electronics show steady profit.
  - **Recommendation:** Focus marketing and stock efforts on the Top 10 profitable items.
-



## 7. Dashboard 3: Customer Insights

### **Purpose:**

To understand customer demographics, spending behavior, and loyalty segments.

### **Visual Components:**

1. **Cards:** Customer Count, Average Sales per Customer, Average Age.
2. **Pie Chart:** Customer Category (Loyal, Normal, New).

- 3. **Clustered Column Chart:** Sales by Category and Gender → drilldown to Subcategory.
- 4. **Table:** Customer Name | Total Sales (sorted descending).
- 5. **Line Chart:** Sales by Age and Year.
- 6. **Filters:** Year, Category, Region.

**Analytical Insights:**

- **Loyal Customers:** Represent <20% but contribute >60% of total sales.
- **Average Age:** 32 years; most active segment is 25–34.
- **Gender Split:** Female customers dominate Fashion sales; male customers lead in Electronics.
- **Customer Distribution:** "New" category is growing, showing potential for retention strategies.

---

**8. Business Insights Summary**

Area	Key Finding
Sales	Growth dropped by 27%, signaling need for better pricing or marketing efforts.
Profitability	Uneven margins across products; potential overpricing or high costs in certain categories.
Customers	Loyal customers dominate sales, emphasizing importance of retention.
Seasonality	Strong peaks around holidays → high responsiveness to seasonal campaigns.
Regional Performance	Regional inequality — need to replicate successful strategies across stores.

---

9. Strategic Recommendations

Area	Action
Sales Strategy	Launch seasonal promotions and regional campaigns to boost underperforming areas.
Pricing Policy	Review UnitPrice–CostPrice ratios; apply dynamic pricing for high-demand periods.
Product Portfolio	Reduce inventory of low-margin products and promote high-profit items.
Customer Loyalty	Implement reward systems and personalized offers for top spenders.
Marketing Focus	Target customers aged 25–34 with interest-based recommendations.
Operational Benchmarking	Study top-performing stores and replicate their success models.

10. Technical Summary

Category	Description
Tool Used	Microsoft Power BI
Data Volume	5,000+ records
Data Model	Star Schema (Transactions fact + 4 dimensions)
Main Techniques	Power Query Cleaning, DAX Modeling, Drilldowns, KPIs
Period Covered	2023–2025

Category	Description
aProject Type	Portfolio Project (Built to simulate real client work)

---

## 11. Conclusion

This project represents a **complete Power BI case study** — transforming raw retail sales data into actionable business insights.

It demonstrates strong capabilities in:

- Data Cleaning & Modeling
- DAX Calculations
- Analytical Reasoning
- Dashboard Design & Storytelling

Although based on public data, the workflow, methods, and presentation are identical to those used in **real corporate analytics projects**.

This ensures the project reflects a **professional, job-ready standard**, suitable for inclusion in a **data analytics portfolio**, **GitHub repository**, or **LinkedIn presentation**.

 **Email:** [ademtoumi739@gmail.com](mailto:ademtoumi739@gmail.com)