MAVEN MARKET

Problem Statement

Maven Market, a nationwide retail chain, has observed fluctuating sales, inconsistent customer retention, and high return rates across different regions and time periods. To support data-driven decisions, the company seeks to:

1. **Identify key drivers of revenue growth** by analysing transaction patterns across regions, stores, products, and time.
2. **Understand customer demographics and behaviour** to improve marketing strategies and increase retention.
3. **Analyse return patterns** to identify potential issues with products, stores, or customer segments.
4. **Optimize product offerings and inventory** by examining product performance across categories and locations.

Tools Used

Power BI
Used as the primary platform for data visualization and interactive dashboard creation. Power BI allowed dynamic exploration of sales, returns, customer behavior, and regional performance metrics through slicers, filters, and drill-down capabilities.

Power Query
Used within Power BI for data extraction, cleaning, and transformation (ETL). Power Query was essential for combining and shaping data from multiple sources, including transactions, returns, customer details, product info, and calendar data.

Data Model (Power BI Relationships)
Built a structured data model by establishing relationships across seven datasets (Transactions, Products, Customers, Returns, Stores, Regions, Calendar). This model enabled seamless cross-table analysis in reports.

DAX (Data Analysis Expressions)
Created calculated columns and complex measures using DAX for key business metrics including:

- Total Sales, Profit Margin, and Return Rates
- Sales Performance by Region, Product Category, and Store Type

- Monthly and Year-over-Year comparisons
- Customer Segmentation and Product-Level Trends

Project Process Brief – Maven Market Retail Analysis

1. Data Collection & Preparation

Imported raw data from multiple CSV files covering transactions, customers, products, returns, store locations, calendar dates, and regions.
Utilized **Power Query** to clean and standardize datasets by:

- Removing nulls, duplicates, and formatting inconsistencies
- Merging lookup tables (e.g., product and region info)
- Consolidating 1997 and 1998 transactions into a unified sales dataset

2. Data Modelling

Constructed a relational data model in **Power BI** using:

- Star schema principles with a central fact table (transactions) and multiple dimension tables
- Defined relationships across **7 datasets** to support interactive visuals
- Enabled efficient cross-filtering and roll-up aggregations

3. DAX Calculations

Created **custom DAX measures and calculated columns** to support business KPIs and insights such as:

- Total Sales, Profit, and Return Rates
- Customer Lifetime Value and Segmentation
- Monthly and YoY Sales Trends
- Store and Product Category Performance
- Average Order Value & Return Analysis

These calculations enabled deeper exploration into retail performance and customer behaviour.

4. Dashboard Development

Designed a suite of interactive dashboards in **Power BI**, including:

- **Sales Overview Dashboard** – product, region, and time-based trends
- **Customer Insights Dashboard** – segmentation, value analysis, and returns behaviour
- **Returns & Refunds Dashboard** – patterns by store, product category, and customer type
- **Store Performance Dashboard** – comparing physical locations by metrics like revenue, returns, and product mix

  Dashboards featured slicers, tooltips, conditional formatting, and bookmarks for smooth user interaction.

  5. Review & Optimization

- Validated data integrity and accuracy of metrics against known business logic
- Optimized data model using best practices (e.g., removing unused columns, proper data types)
- Improved report responsiveness and readability for end users with clean visuals and intuitive layouts

1. Customer Overview Dashboard

Focus: Demographics & Membership Insights

Key Highlights:

- **Total Customers**: 10,281
- **Gender Split**:
    - Male: 5,184
    - Female: 5,097
- **Occupation Distribution**:
    - Professional: 3,382
    - Skilled Manual: 2,650
    - Manual: 2,583
    - Management: 1,461
    - Clerical: 205

Membership Status Breakdown:

- Golden: 6,000 (55.47%)
- Normal: 2,418 (23.54%)
- Bronze: 1,200 (11.65%)
- Silver: 1,000 (9.34%)

Education Levels:

- Partial High School & High School Degree dominate the education share.
- Bachelor's degree: ~3.5K customers
- Graduate Degree: ~1K customers

Customer Growth Over Time:

- Sharp rise from 1990 (1.1K) to 1993 (10.3K).
- Slight drop noted in 1994 (1.3K).

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2. Product Performance Dashboard

Focus: Brand Sales & Product Characteristics

Overall Metrics:

- **Total Products**: 1,560
- **Total Sales**: ₹1.76M

Top-Selling Brands by Sales:

- Carrington: ₹36,066.67
- Big Time: ₹39,344.18
- Best Choice: ₹42,738.02

Top Products by Quantity:

- Hilltop Mint Mouthwash: 676
- Hermanos Green Pepper: 645
- Great Pumpernickel Bread: 644
- Garden Cheese: 609
- Fabulous Strawberry Drink: 602

Product Characteristics:

- **Low Fat**:
    - Yes: 64.62%
    - No: 35.38%
- **Recyclable**:
    - Yes: 55.9%
    - No: 44.1%

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3. Store Insights Dashboard

Focus: Store Types, Locations & Year

Total Stores: 24
Total States Covered: 10
Years Covered: 1997 & 1998

Store Type Quantity (Top to Low):

- Supermarket: Highest quantity
- Deluxe Supermarket: Second highest
- Gourmet & Mid-Size Grocery: Lower contribution

Store Type–Wise Sales:

- Supermarkets lead in overall sales
- Deluxe Supermarkets follow

Sales Trends (Monthly by Store Type):

- Sales peak in November and December
- Deluxe and regular Supermarkets consistently perform better than other types

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4. Sales Distribution Dashboard

Focus: Geography & Temporal Analysis

Sales by Country:

- United States: 1.18M (66.76%)
- Mexico: 0.48M (27.22%)
- Canada: 0.11M (6.1%)

Sales by Region (Top 3):

- Northwest
- Mexico Central
- Southwest

Sales by Year:

- 1998 outperformed 1997 significantly

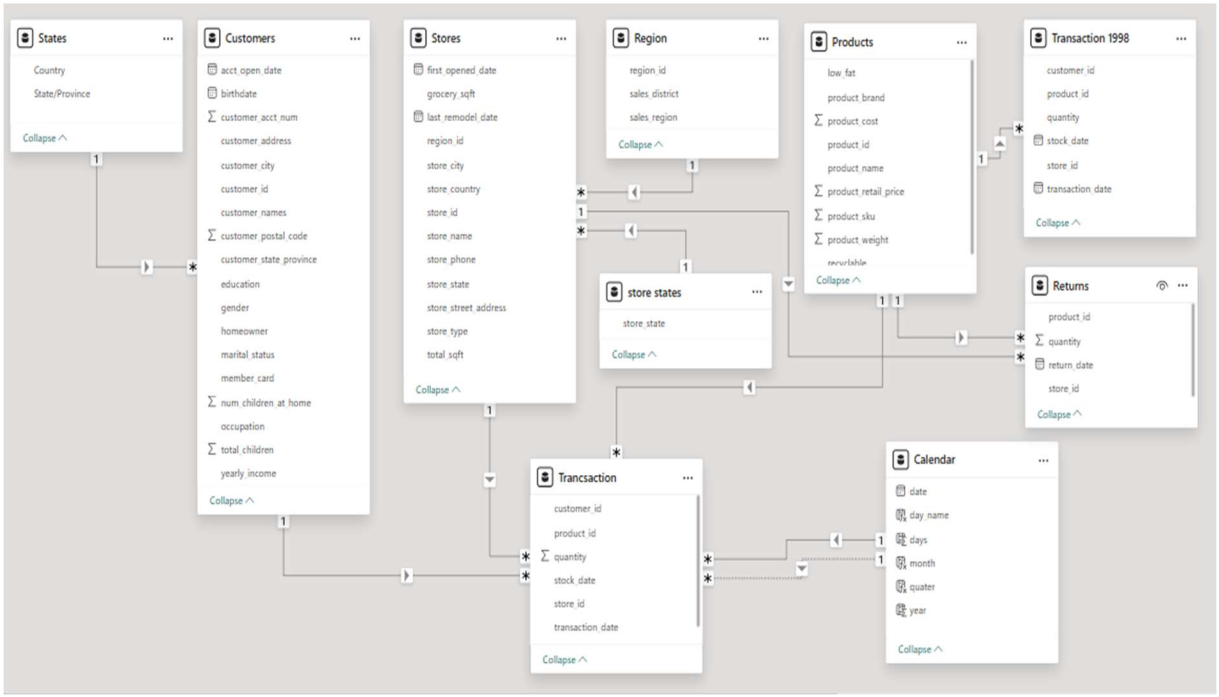
Sales by Month:

- Gradual upward trend through the year
- Peak in December: 177K

Sales by Store Type:

- Supermarkets lead
- Deluxe Supermarkets are second highest

Data Model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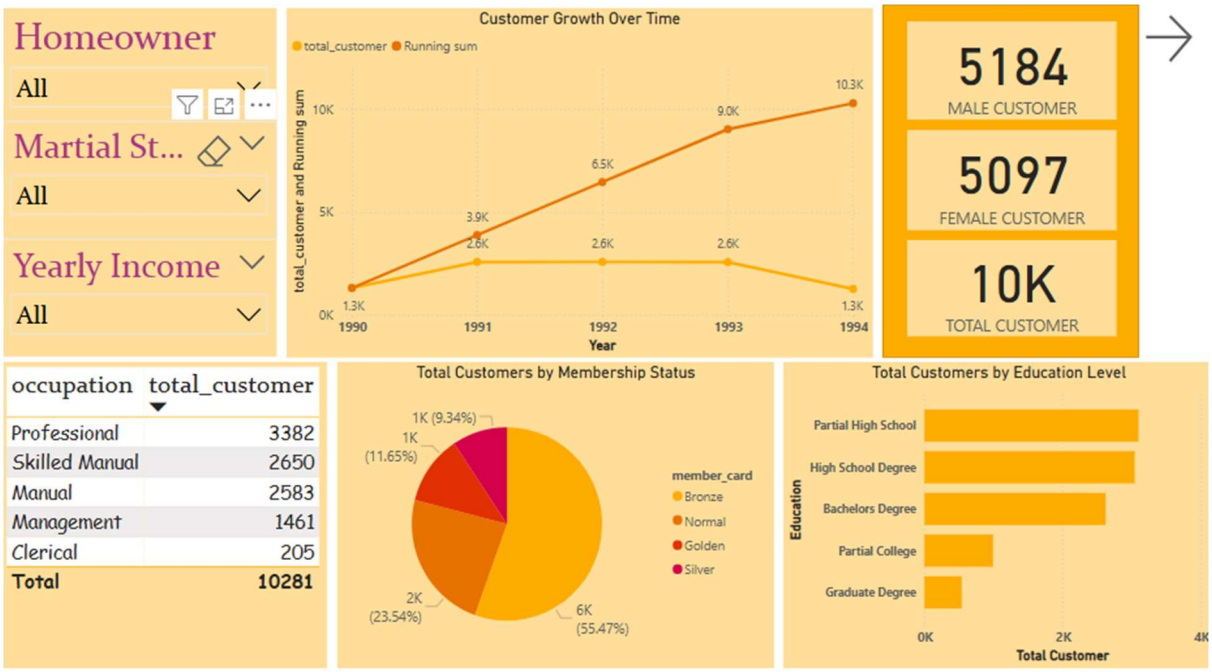
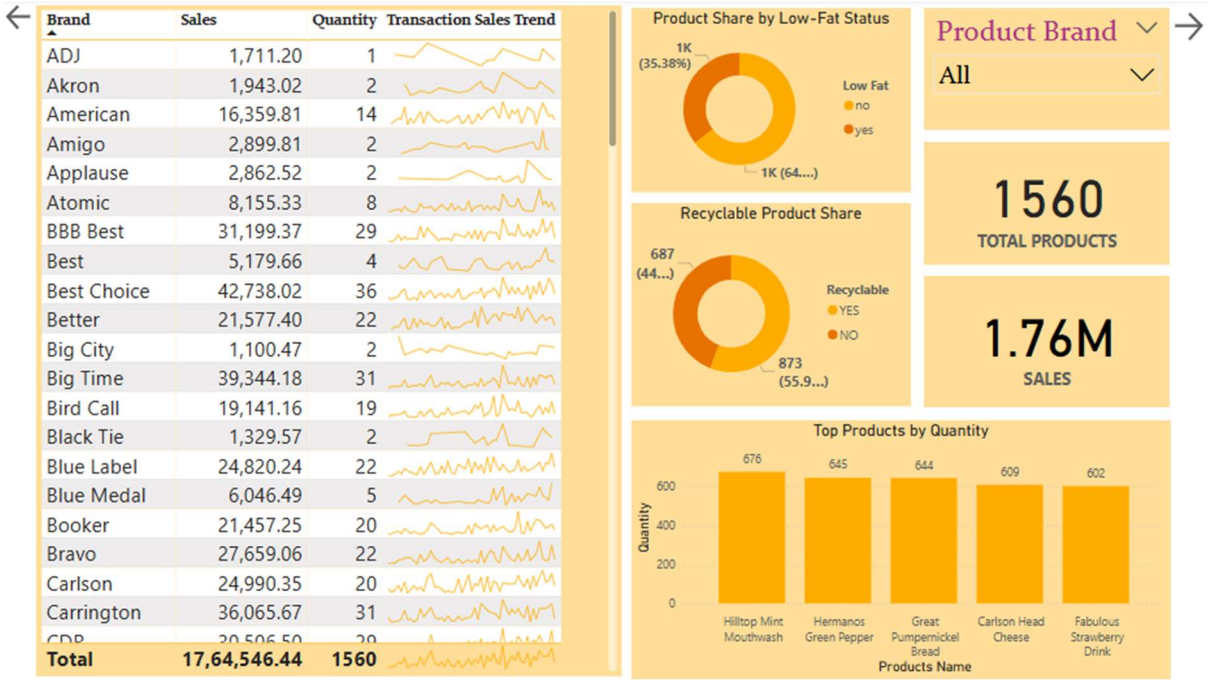
DASHBOARDS

1. Customer Insights Dashboard



2. Product Performance Dashboard



3. Store Operations Dashboard

4. Sales Performance Dashboard

Project Outcome

The completion of the Maven Market Retail Analytics Dashboard project led to enhanced business intelligence and operational improvements across sales, customer management, and store operations. The outcomes are summarized below:

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1. **Improved Sales Visibility**
   Delivered a consolidated view of sales by product, region, store type, and time. Enabled the identification of top-performing brands and peak months (e.g., December with 177K in sales), supporting better forecasting and planning.
2. **Enhanced Customer Understanding**
   Segmented customers by gender, education, occupation, and membership level. Identified high-value customer groups, such as professionals and golden/silver card holders, to support targeted retention and marketing efforts.
3. **Optimized Product Performance Monitoring**
   Tracked sales and quantity by 1,560 product brands. Visualized product trends using sparklines. Assessed product attributes like low-fat and recyclable status to align with sustainability goals and consumer preferences.
4. **Store Type & Regional Insights**
   Analysed performance across 24 stores and five store types. Supermarkets and deluxe supermarkets emerged as the most effective channels. Regional analysis showed the Northwest region as the top contributor to overall sales.
5. **Time-Based Sales Analysis**
   Year-over-year and monthly trend analysis highlighted seasonal spikes and growth from 1997 to 1998. This supported strategic decisions related to promotions and stocking strategies.
6. **Interactive Dashboard Experience**
   Implemented slicers and filters (e.g., year, store type, country, homeowner status) to enable dynamic exploration. Executives gained self-service access to key metrics through interactive, real-time dashboards.

Problems Faced

1. **Data Inconsistencies**
   Many datasets had missing values, inconsistent formats, and duplicate entries, which required significant cleaning and preprocessing using Power Query.
2. **Complex Table Relationships**
   Establishing relationships between multiple tables was difficult due to missing foreign keys and mismatched columns across transactions, products, and customer tables.
3. **Large Data Volume**
   Handling over 2.6 lakh transaction records caused performance issues in Power BI, especially during model refreshes and when applying complex calculations.
4. **Advanced DAX Measures**
   Writing DAX measures for KPIs like running totals and return rates was challenging, especially understanding filter context and time intelligence functions.
5. **Dashboard Design Optimization**
   Creating visually effective yet performance-optimized dashboards required multiple iterations to balance storytelling, speed, and interactivity across visuals and filters.

Key Learnings

1. **Data Preparation Mastery**
   Gained hands-on experience in cleaning, transforming, and integrating large datasets using Power Query for effective analysis and modelling.
2. **Data Modelling & Relationships**
   Learned to build efficient data models by defining relationships, resolving key mismatches, and applying a star schema for better performance.
3. **Advanced DAX Proficiency**
   Improved skills in writing complex DAX measures for KPIs, time intelligence, and dynamic metrics like running totals and return percentages.
4. **Dashboard Design & Visualization**
   Developed strong skills in designing interactive and insightful Power BI dashboards using KPIs, filters, sparklines, and slicers for storytelling.
5. **Performance Optimization**
   Understood techniques to optimize large data models and improve Power BI performance through query folding, column reduction, and measure simplification.