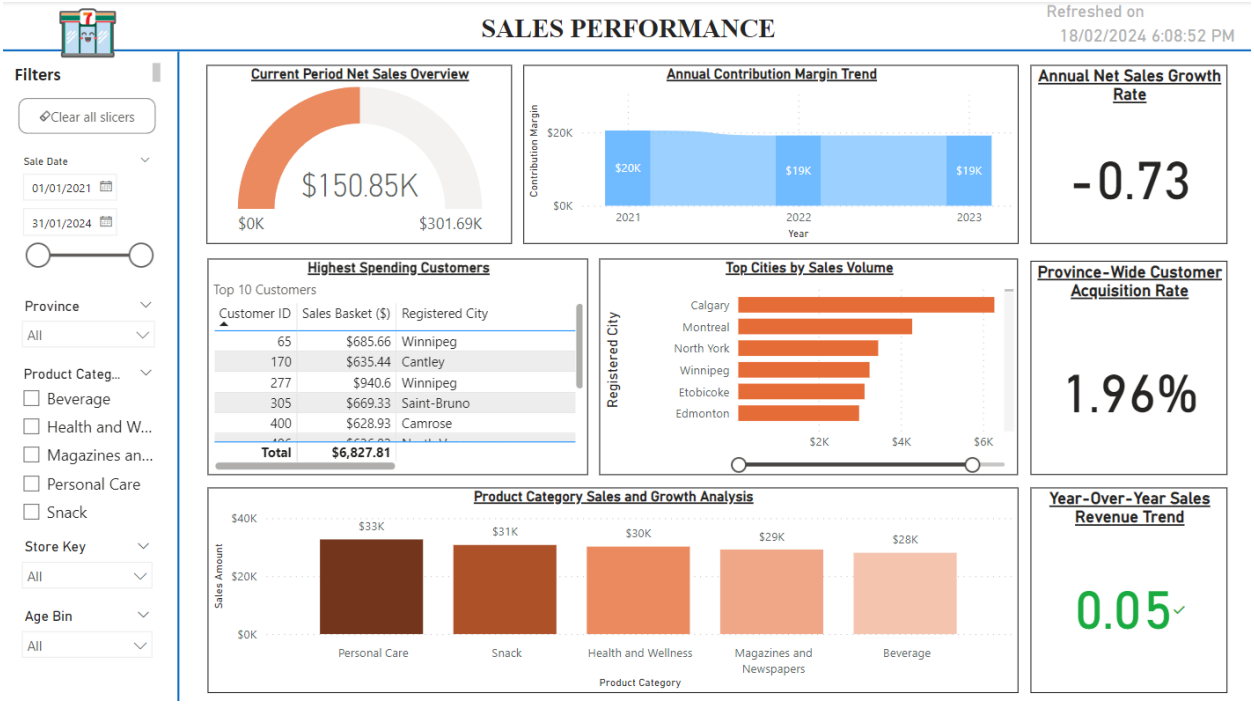
Functional Requirements Document

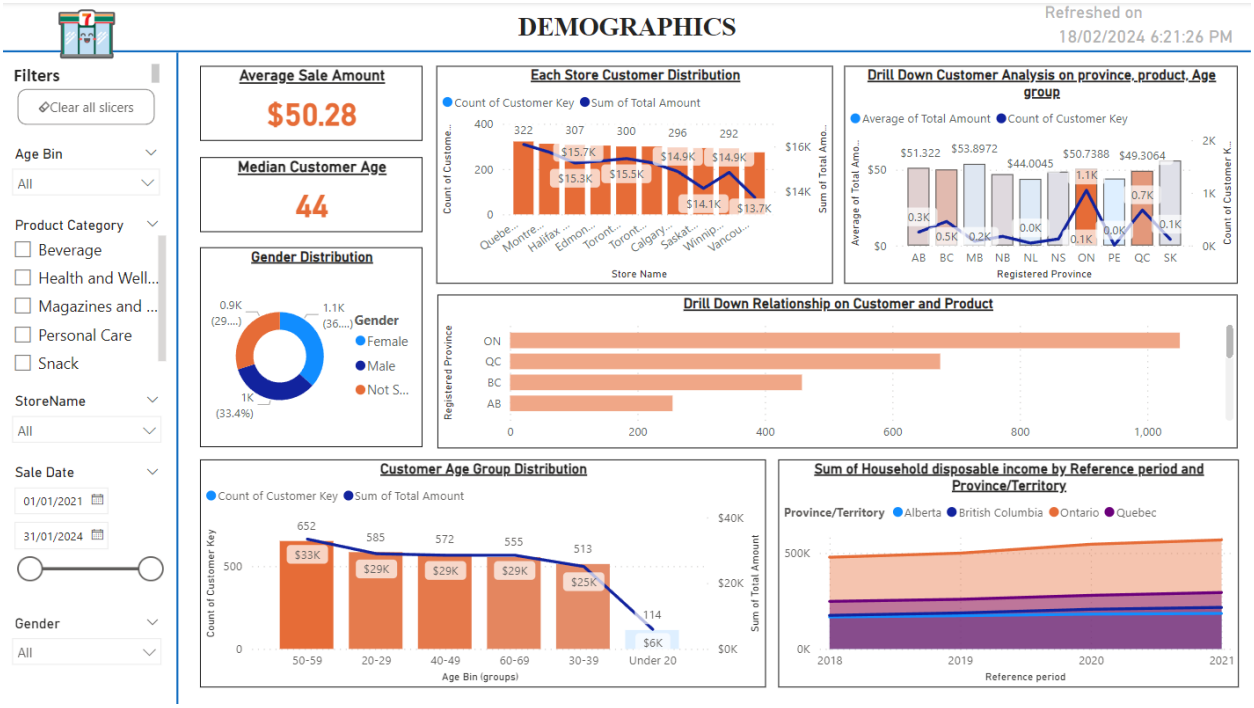
Functional Requirements Document (Affordance) The FRD will serve as a guide for the dashboard development process, ensuring alignment with the company's strategic goals and user requirements.	
Dashboard's Purpose	The goal is to create a dynamic and interactive dashboard that provides insights into the best location for a new 24Seven store, leveraging historical sales, customer demographics, product categories, and store geographic data.
Stakeholder Analysis	Key stakeholders include 24Seven's business strategy team, store executives, and frontline decision-makers who will utilize the dashboard to drive expansion efforts.
Data Requirements	Harness historical sales records, customer demographics, product categories, and store locations, along with external datasets like census data, economic indicators, and foot traffic information.
Functional Requirements (UCs)	• Data integration - automated ingestion and transformation of data sources • Visualizations - interactive charts, maps, and tables to visualize sales trends, demographic profiles, and geographic distribution. • Dashboard interactivity - enable users to filter, sort, and drill down into data for nuanced analysis. • Design & layout - to ensure the dashboard is user-friendly, with a logical flow and a focus on the most impactful data visualizations.
Acceptance Criteria	Dashboard load times should not exceed 10 seconds for initial load and 5 seconds for data refresh or filtering actions, ensuring a smooth user experience even with large datasets. Performance benchmarks can be established using Power BI's performance analyzer tool.
Assumptions	Underlying assumptions, such as the availability and reliability of data sources, and dependencies that could impact dashboard functionality, are documented.

Overview of Final Dashboard – Report View

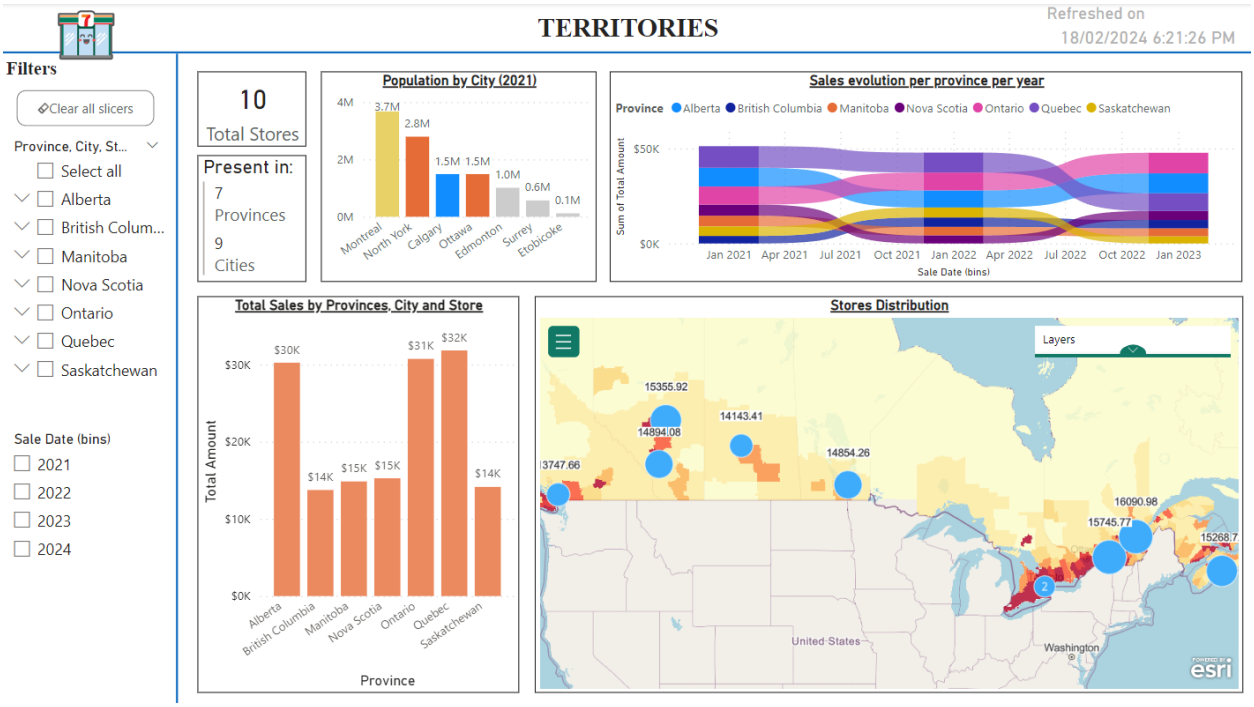
Page 1: Sales Performance



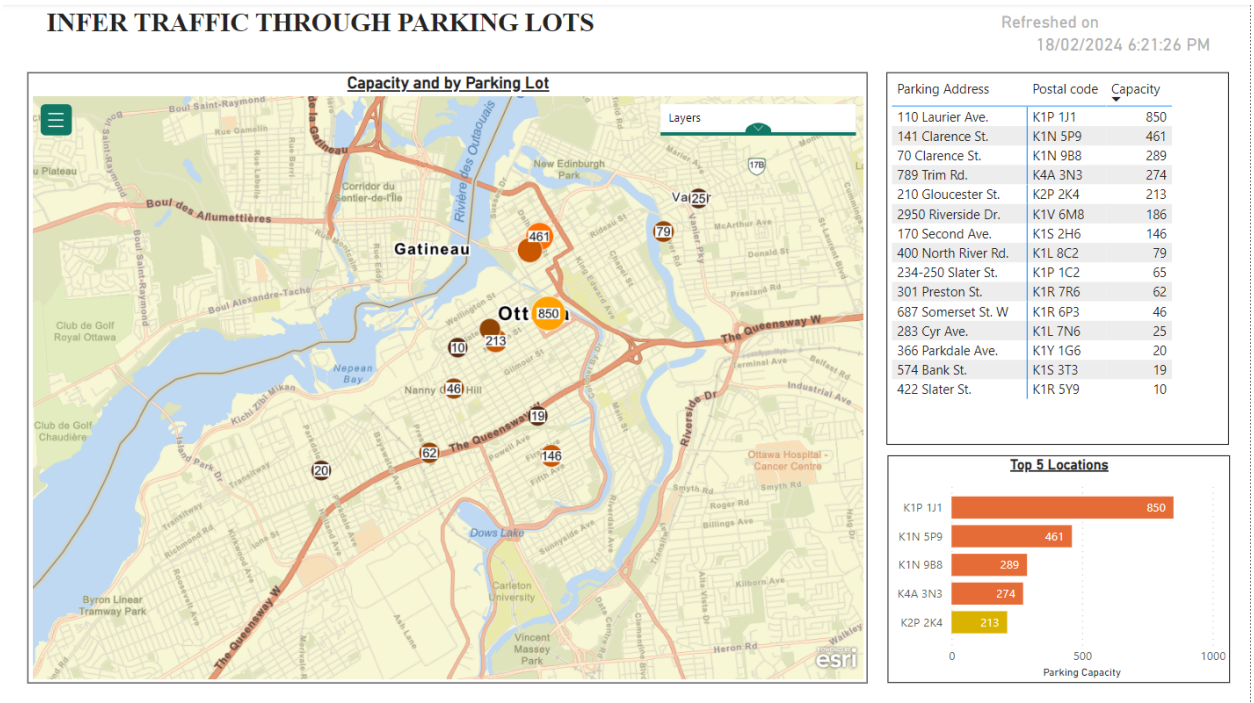
Page 2: Demographics



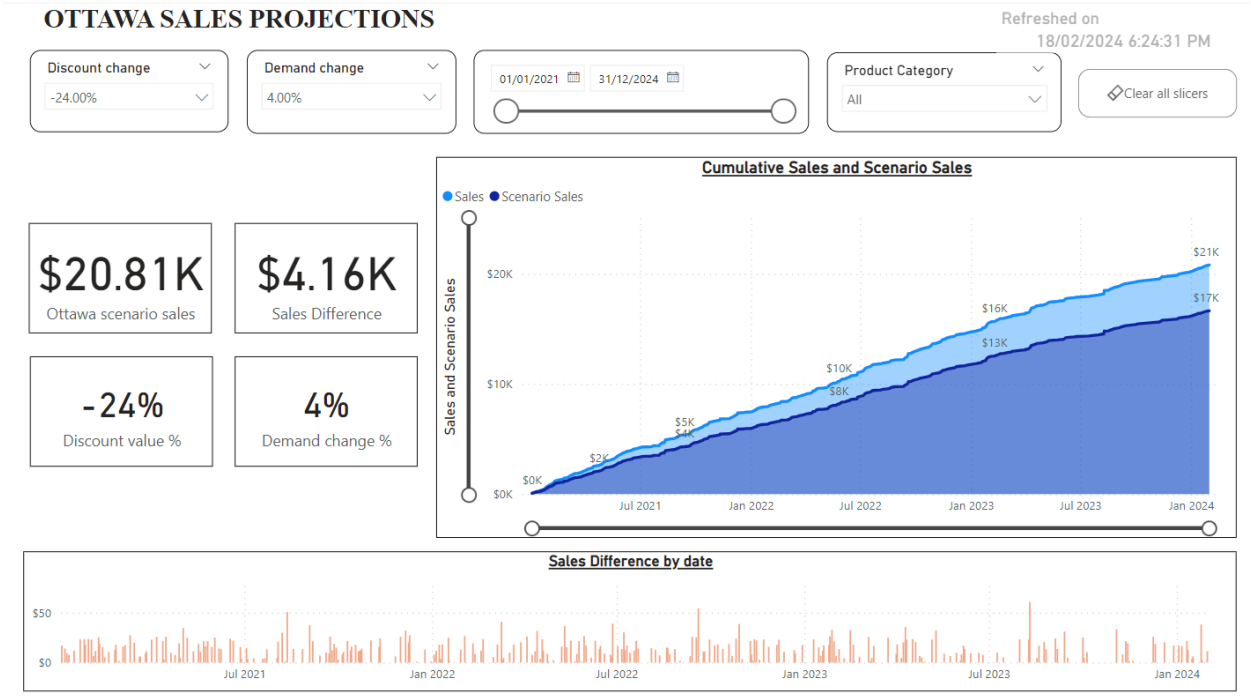
Page 3: Territories



Page 4: Traffic



Page 5: Sales Projections



Preprocessing Steps for Internal Data Tables

"Customers" Table

1. Removed duplicates. Shape changed from (11, 500) to (11, 499)
2. Deleted columns: "Registered City", "Phone", "Email" because they do not contain information
3. Replaced values in Gender column. Replaced M, F, and "Not specified" with "Male", "Female" respectively
4. Changed Age to whole number
5. In DAX, created new column called "Age Bin" to group customers in 10 years old age bins

```
Age Bin = IF(
    Customers[Age] < 20, "Under 20",
    IF(
        Customers[Age] < 30, "20-29",
        IF(
            Customers[Age] < 40, "30-39",
            IF(
                Customers[Age] < 50, "40-49",
                IF(
                    Customers[Age] < 60, "50-59",
                    IF(
                        Customers[Age] < 70, "60-69",
                        IF(
                            Customers[Age] < 80, "70-79",
                            IF(
                                Customers[Age] < 90, "80-89",
                                IF(
                                    Customers[Age] < 100, "90-99",
                                    IF(
                                        Customers[Age] <= 120, "100-120",
                                        "Invalid Age Range"
                                    )
                                )
                            )
                        )
                    )
                )
            )
        )
    )
)
```

6. Trimmed “Postal Code” to match format in *Stores* table

“Historical Sales” Table

---

1. In Table View, Displayed “Total Amount” as $ value

“Stores” Table

---

1. Deleted “Address” because it contains no information
2. Trimmed “PostalCode” to remove trailing blank space

Preprocessing Steps for External Data Tables

- AVERAGE EXPENDITURE PER HOUSEHOLD.csv [Access Link]
  - There is no standard for the size of the household. Larger families tend to have higher expenditure.

- PROVINCE ABBREVIATIONS.csv
  - Use first row as headers
  - Connect with tables containing full province names, like TAX RATE

POPULATION BY PROVINCE (2021 Q1 - 2023 Q4).csv [Access Link]
  - Connected "GEO" to "Province/Territory" in the abbreviations table
  - Renamed "GEO" as "Province/Territory" for consistency

- HOUSEHOLD INCOME AND NET SAVINGS.csv [Access Link]

Period is from 2018-2021 (2022 and later was not available)
  - Removed empty rows
  - Removed top 5 rows containing metadata
  - Removed bottom 4 rows containing footnotes
  - Promoted first row as headers
  - Changed column name from "Geography" to "Province/Territory" matching other columns

- parking_lots_clean.csv [Access Link]
  - Parking Data in Ottawa to infer traffic level
  - Changed data types for latitude and longitude

- POPULATION_SHORTLISTED.csv [Access Link]
  - Within bar chart, apply filter to only select "feature" containing "Population in 2021"

- MONTREAL SALES FOR SCALING.csv
  - Used table to get historical sales
  - Applied filter to only show Montreal sales
  - Exported table
  - Imported table
  - Renamed "Amount" to "Montreal Amount"
  - Created "Ottawa scenario amount"

```
Ottawa scenario amount = (0.4*'MONTREAL
SALES FOR SCALING'[Montreal Amount] *
[OTTAWA_MONTREAL_POPULATION_RATIO]) +
(0.6* 'MONTREAL SALES FOR
SCALING'[Montreal Amount]
*[OTTAWA_MONTREAL_INCOME_RATIO])
```

Power Query & DAX Operations on New Tables

Sales Performance page

Net Sales

```
Net Sales = SUM('Historical Sales'[Total Amount])
```

Description: *The 'Net Sales' metric represents the total revenue generated from all transactions recorded in the 'Historical Sales' dataset. This measure aggregates the 'Total Amount' column, which contains the sales figures for each transaction, to provide a comprehensive sum. It serves as a foundational figure from which various other analyses and comparisons can be drawn, offering a snapshot of the company's sales performance over the entire data set. It is a crucial indicator of overall business health and is typically used as a baseline metric in sales trend analyses and performance dashboards.*

MoM Growth (Month-over-Month Growth):

```
MoM Growth =
VAR CurrentMonthSales = CALCULATE([Net Sales], DATESMTD('Historical Sales'[Sale Date]))
VAR PreviousMonthSales = CALCULATE([Net Sales], DATEADD(DATESMTD('Historical Sales'[Sale
Date]), -1, MONTH))
RETURN
IF(
    NOT ISBLANK(CurrentMonthSales),
    (CurrentMonthSales - PreviousMonthSales) / PreviousMonthSales,
    BLANK()
)
```

Description: *The 'MoM Growth' metric calculates the percentage change in 'Net Sales' from the previous month to the current month. This is achieved by first determining the current month's sales and then calculating the sales for the preceding month. The growth rate is expressed as a percentage, providing a quick indicator of short-term sales trends and monthly performance fluctuations. It is particularly useful for detecting seasonal patterns or the impact of marketing campaigns and other monthly events on sales.*

YoY Growth (Year-over-Year Growth):

```
YoY Growth =
VAR CurrentYearSales = CALCULATE([Net Sales], DATESYTD('Historical Sales'[Sale Date]))
VAR PreviousYearSales = CALCULATE([Net Sales], DATEADD(DATESYTD('Historical Sales'[Sale
Date]), -1, YEAR))
RETURN
IF(
    NOT ISBLANK(CurrentYearSales),
```

```
    (CurrentYearSales - PreviousYearSales) / PreviousYearSales,
    BLANK()
)
```

Description: *The 'YoY Growth' metric is designed to measure the growth of 'Net Sales' over the same period in the previous year. By comparing the total sales from the start of the current year to the same date, against the total sales for the equivalent period in the previous year, this metric provides a percentage that highlights year-over-year growth. This long-term growth indicator is crucial for understanding overall business trajectory and for making year-to-year strategic comparisons and planning.*

Annual Sales Revenue Growth

```
Annual Sales Revenue Growth =
VAR MaxDate = MAX('Historical Sales'[Sale Date])
VAR MinDate = MIN('Historical Sales'[Sale Date])
RETURN
DIVIDE(
    CALCULATE([Net Sales], FILTER(ALL('Historical Sales'[Sale Date]), 'Historical Sales'[Sale
Date] = MaxDate)) -
    CALCULATE([Net Sales], FILTER(ALL('Historical Sales'[Sale Date]), 'Historical Sales'[Sale
Date] = MinDate)),
    CALCULATE([Net Sales], FILTER(ALL('Historical Sales'[Sale Date]), 'Historical Sales'[Sale
Date] = MinDate))
)
```

Description: *The 'Annual Sales Revenue Growth' measure evaluates the growth in net sales from the earliest to the latest date in the 'Historical Sales' dataset. By determining the net sales at the start and end of the available data range, this metric reflects the overall increase or decrease in revenue during the entire period captured in the dataset. It is a vital indicator of the business's progression over time and is often used to assess the effectiveness of long-term sales strategies and business development efforts.*

Total Potential Customers by Province

```
Total Potential Customers by Province =
SUMX(
    VALUES('POPULATION'[GEO]), // Unique list of provinces
    CALCULATE(
        MAX('POPULATION'[POPULATION]), // Assuming we take the most recent population figure
per province
        LASTDATE('POPULATION'[REF_DATE]) // The most recent date for the population data
    ) * SWITCH(
        TRUE(),
        'POPULATION'[GEO] = "Ontario", 0.07, // Assuming 7% for Ontario
        'POPULATION'[GEO] = "Quebec", 0.065, // Assuming 6.5% for Quebec
        'POPULATION'[GEO] = "British Columbia", 0.06, // BC
        'POPULATION'[GEO] = "Alberta", 0.055, // Alberta
        'POPULATION'[GEO] = "Manitoba", 0.05, // Manitoba
```

```
        'POPULATION'[GEO] = "Saskatchewan", 0.05, // Saskatchewan
        'POPULATION'[GEO] = "Nova Scotia", 0.05, // Nova Scotia
        'POPULATION'[GEO] = "New Brunswick", 0.045, // New Brunswick
        'POPULATION'[GEO] = "Newfoundland and Labrador", 0.045, // Newfoundland and Labrador
        'POPULATION'[GEO] = "Prince Edward Island", 0.04, // Prince Edward Island
        'POPULATION'[GEO] = "Northwest Territories", 0.035, // Northwest Territories
        'POPULATION'[GEO] = "Yukon", 0.035, // Yukon
        'POPULATION'[GEO] = "Nunavut", 0.035, // Nunavut
        0.04 // Default for any other or unspecified province
    )
)
```

Description: *This measure estimates the total number of potential customers in each Canadian province by applying specific percentages to the latest available population figures, reflecting varying market penetrations. For example, 7% of Ontario's population is considered potential customers, acknowledging the province's high urbanization and economic activity. This measure allows for a targeted analysis of market size and is pivotal for strategic planning in customer acquisition campaigns.*

Customer Acquisition Rate by Province

```
Customer Acquisition Rate by Province =
CALCULATE(
    DIVIDE(
        DISTINCTCOUNT('Customers'[Customer Key]),
        [Total Potential Customers by Province],
        0
    ) * 100,
    ALL('Customers')
)
```

Description: *The 'Customer Acquisition Rate by Province' is a critical measure that represents the ratio of acquired customers to the estimated total market potential within each province. It multiplies the distinct count of customers by 100 to express this ratio as a percentage, providing a clear benchmark of the company's market penetration and the effectiveness of its customer acquisition strategies at the provincial level.*

Product Mix Efficiency:

```
Product Mix Efficiency =
CALCULATE(
    SUM('Historical Sales'[Total Amount]),
```

```
    ALL('Product Category')
) / SUM('Historical Sales'[Total Amount])
```

Description: *The 'Product Mix Efficiency' metric evaluates the relative contribution of each product category to the total sales volume. By calculating the total sales amount for each category and dividing it by the total sales amount across all categories, this measure provides insight into which categories are performing best. It helps in understanding the sales distribution across different product lines, facilitating strategic decisions regarding product focus and inventory management.*

Contribution Margin

```
Contribution Margin =
SUM('Historical Sales'[Total Amount]) * (1 - 0.60)
```

1. Used the 'Income & Savings' data to determine an average profit margin for the industry or for similar products.
2. Estimated the average profit margin – assuming the cost is 60% of the selling price.
3. Calculated the contribution margin for each product by subtracting the estimated cost from the selling price.

Description: *The 'Contribution Margin' metric is derived by applying an assumed cost percentage (in this case, 60%) to the total sales amount, effectively estimating the profit contribution of sales before fixed costs. This approach uses industry or similar product data to infer an average profit margin, where the cost is presumed to be 60% of the selling price. The resulting figure represents the margin that contributes towards covering fixed expenses and generating profit, crucial for assessing product profitability and guiding pricing strategies.*

Average Transaction Value

```
Average Transaction Value =
AVERAGEX(
    'Historical Sales',
    'Historical Sales'[Total Amount]
)
```

Description: *The 'Average Transaction Value' metric quantifies the mean sales amount per transaction across all sales recorded in the 'Historical Sales' dataset. This calculation is performed by taking the average of the 'Total Amount' field for each sale, providing a straightforward measure of how much, on average, customers spend per purchase. This insight is invaluable for understanding spending behavior, optimizing product pricing strategies, and identifying opportunities to increase sales through upselling or cross-selling.*

Additional Metrics Considered but Not Implemented:

Net Sales Before Tax =

```
SUM('Historical Sales'[Total Amount]) / (1 + RELATED('TAX RATE'[Tax Rate]))
```

Purchasing Power Adjusted Sales =

```
CALCULATE(
    [Net Sales],
    FILTER(
        ALL('Income & Savings'),
        RELATED('Stores'[PostalCode]) = 'Income & Savings'[PostalCode]
    )
) * RELATED('Income & Savings'[Average Income + Savings])
```

Considering: Average Income + Savings

```
Average Income + Savings =
AVERAGEX(
    'Income & Savings',
    'Income & Savings'[Household Disposable Income] + 'Income & Savings'[Household Net Saving]
)
```

"AAA MEASURES" table

---

1. Created Ottawa Population measure "OTTAWA_POPULATION_21"

```
OTTAWA_POPULATION_21 =
CALCULATE (
    VALUES ( POPULATION_SHORTLISTED[Population] ),
    FILTER (
        POPULATION_SHORTLISTED,
        POPULATION_SHORTLISTED[Feature] = "Population, 2021"
            && POPULATION_SHORTLISTED[City] = "Ottawa"
    )
)
```

2. Created Montreal Population measure "MONTREAL_POPULATION_21"

```
MONTREAL_POPULATION_21 =
CALCULATE (
    VALUES ( POPULATION_SHORTLISTED[Population] ),
    FILTER (
        POPULATION_SHORTLISTED,
        POPULATION_SHORTLISTED[Feature] = "Population, 2021"
            && POPULATION_SHORTLISTED[City] = "Montreal"
```

```
    )
)
```

3. Created new measure called “OTTAWA_MONTREAL_POPULATION_RATIO” by dividing Ottawa to Montreal population

```
OTTAWA_MONTREAL_POPULATION_RATIO = [OTTAWA_POPULATION_21]/[MONTREAL_POPULATION_21]
```

4. Created measure called “OTTAWA_INCOME_21” to get the household income of Ontario in 2021

```
OTTAWA_INCOME_21 =
CALCULATE (
    VALUES ( 'HOUSEHOLD INCOME AND NET SAVINGS'[Household disposable income]),
    FILTER (
        'HOUSEHOLD INCOME AND NET SAVINGS', 'HOUSEHOLD INCOME AND NET
SAVINGS'[Province/Territory] = "Ontario"
        && 'HOUSEHOLD INCOME AND NET SAVINGS'[Reference period] = 2021
    )
)
```

5. Created measure called “MONTREAL_INCOME_21” to get the household income of Quebec in 2021

```
MONTREAL_INCOME_21 =
CALCULATE (
    VALUES ( 'HOUSEHOLD INCOME AND NET SAVINGS'[Household disposable income]),
    FILTER (
        'HOUSEHOLD INCOME AND NET SAVINGS', 'HOUSEHOLD INCOME AND NET
SAVINGS'[Province/Territory] = "Quebec"
        && 'HOUSEHOLD INCOME AND NET SAVINGS'[Reference period] = 2021
    )
)
```

6. Created new measure called “OTTAWA_MONTREAL_INCOME_RATIO” by dividing Ottawa to Montreal population

```
OTTAWA_MONTREAL_INCOME_RATIO = [OTTAWA_INCOME_21]/[MONTREAL_INCOME_21]
```

7. Created “OTTAWA_SCENARIO_TOTAL_SALES” by summing Ottawa’s scenario sales from the Montreal sales table

```
OTTAWA_SCENARIO_TOTAL_SALES = SUM('MONTREAL SALES FOR SCALING'[Ottawa scenario amount])
```

8. Created “CUMULATIVE_OTTAWA_SCENARIO_SALES” by adding the sales by each date in the Montreal sales table

```
CUMULATIVE_OTTAWA_SCENARIO_SALES =
CALCULATE(
    [OTTAWA SCENARIO TOTAL SALES],
```

```
    FILTER(
        ALLSELECTED( 'MONTREAL SALES FOR SCALING' ),
        'MONTREAL SALES FOR SCALING'[Sale Date] <= MAX( 'MONTREAL SALES FOR SCALING'[Sale
Date] )
    )
)
```

9. Created “ADJUSTED_OTTAWA_SCENARIO_TOTAL_SALES”

```
ADJUSTED_OTTAWA_SCENARIO_TOTAL_SALES =
SUMX (
    'MONTREAL SALES FOR SCALING',
    (
        'MONTREAL SALES FOR SCALING'[Ottawa scenario amount] +
        'MONTREAL SALES FOR SCALING'[Ottawa scenario amount] * [Discount value %] +
        'MONTREAL SALES FOR SCALING'[Ottawa scenario amount] * 'Demand change'[Demand change
%]
    )
)
```

10. Created “CUMULATIVE_ADJUSTED_OTTAWA_SCENARIO_SALES” by adding the sales by each date in the Montreal sales table

```
CUMULATIVE_ADJUSTED_OTTAWA_SCENARIO_SALES =
CALCULATE(
    [ADJUSTED_OTTAWA_SCENARIO_TOTAL_SALES],
    FILTER(
        ALLSELECTED( 'MONTREAL SALES FOR SCALING' ),
        'MONTREAL SALES FOR SCALING'[Sale Date] <= MAX( 'MONTREAL SALES FOR SCALING'[Sale
Date] )
    )
)
```

11. Created “REFRESHER” to show data refresh time

```
REFRESHER = NOW()
```

“CALENDAR” table

---

1. Used AUTOCALENDAR() to generate a calendar to use as slicer
2. Connected “Date” to “Sales Date” in MONTREAL SALES FOR SCALING table for slicer to be responsive

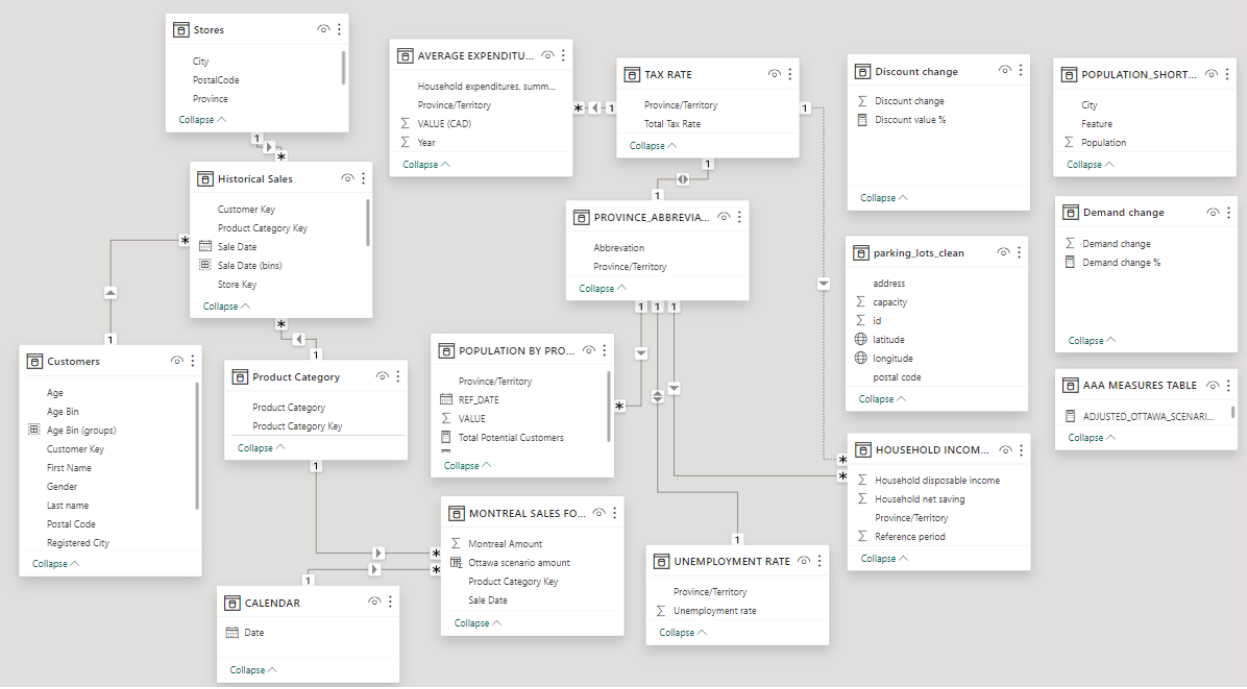
"Demand change" table

1. Created an empty table
2. Created a new column with series from -30% to 70%, with steps of 2%
3. Applied percentage to column

"Discount change" table

1. Created an empty table
2. Created a new column with series from -30% to 0, with steps of 2%
3. Applied percentage to column

Overview of Final Data Model



Main Relationships Description:

- Stores to Historical Sales: Each store can have multiple historical sales records, but each historical sale is associated with one store.
- Product Category to Historical Sales: Each product category can include many historical sales, while each historical sale involves one product category.
- Customers to Historical Sales: A customer can be associated with many historical sales, but each historical sale is linked to one customer.
- Customers to Product Category: There is no direct relationship shown between customers and product categories in the data model.
- Calendar to Historical Sales: The calendar appears to be related to historical sales, likely providing a date dimension, where each sale date in historical sales corresponds to a single date in the calendar, but the calendar date can be linked to many sales records.
- Province Abbreviations to Tax Rate: Each province/territory abbreviation is associated with one tax rate entry, suggesting a one-to-one relationship.
- Province/Territory to Population by Province: Each province/territory has one population entry, indicating a one-to-one relationship.
- Province/Territory to Unemployment Rate: Each province/territory has one unemployment rate entry, also indicating a one-to-one relationship.
- Province/Territory to Household Income: Each province/territory is associated with household income data, likely a one-to-one relationship.
- Montreal Sales to Calendar: Sales data for Montreal has a date dimension provided by the calendar, so each sale record is associated with one date, and each date may have many sales records.
- Parking Lots to Demand Change: There is no direct relationship shown between parking lots and demand change in the data model.