



INSY-695-077 DATA VISUALIZATION WITH POWER-BI

## 24Seven Eleventh Store Location

By

### Group 1

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# 1 Introduction

24Seven is expanding and on the verge of launching its eleventh store. With historical data on sales, customers, and each store's performance, they are poised to make an evidence-based decision to pinpoint the most advantageous location for their new outlet. To determine this optimal location, 24Seven needs to define their priority goals, under which there will be Key Performance Indicators (KPIs) that assess each potential site by leveraging their historical data. A comprehensive, intuitive, and interactive dashboard is essential to facilitate an evidence-based management decision at 24Seven. The aim of this project is to develop a dashboard that will assist in selecting the best location by leveraging the existing historical dataset, incorporating open-source external datasets, and identifying KPIs aligned with the established priority goals.

## 2 Priority Goals

As previously mentioned, the overarching goal of 24Seven is to determine the optimal location for their new store. Consequently, their priority goals are tailored to the factors that are crucial for any convenience store's success. The priority goals deemed essential in informing the optimal location include customers, sales and revenue, and city performance. All the KPIs are derived from these three goals. The rationale for selecting these priority goals is as follows:

### 2.1 Customers

Since the primary objective is to position the new store in the most advantageous location, comprehending the customer demographics at all existing stores, their purchasing habits, and their population size is imperative; thus, designating this as a priority goal is sensible. The KPIs under this priority goal include the percentage of returning customers, the absolute number of returning customers, average transaction per customer, number of unique customers, and customer lifetime value. With these KPIs, the dashboard will illustrate store performance in terms of not just customer quantity but also the quality of customers in each region.

### 2.2 Sales and Revenue

Furthermore, as the goal of any business is to generate profit, another key factor to consider is the sales and revenue from the stores at each location. Therefore, this has been identified as a priority goal, under which there are several KPIs, including total revenue, revenue by store and by product category, transactions processed, best-performing store to identify the store that generates the highest revenue, worst-performing store, and average transaction size.

### 2.3 Regions

Since the objective is to identify the best location, a principal priority goal is to analyze how each city, which can further be detailed by postal code, performs across all facets. This goal includes KPIs such as the business condition index, average low and high temperatures, the coldest city, and the warmest city. The aforementioned KPIs are tied to factors that may influence foot traffic—a determinant upon which convenience stores depend for their success.

### 3 Data Acquisition

For the project’s objective of curating a dashboard that provides insights to identify the best location for the new 24Seven store, external, open-source datasets were explored to supplement the existing dataset. The selection of these datasets was based on the additional information they could offer, particularly in geographical terms, and how they can provide further insight into the priority goals, enabling integration with the current data. Consequently, datasets related to income, local business condition, and weather were chosen from Statistics Canada. The aim is to synthesize the insights from all external sources to inform a well-rounded decision.

#### 3.1 Demographic Data (Age and Income)

Initially, the rationale for including this dataset was the assumption that middle to lower-income citizens are typically the most frequent customers of convenience stores. This dataset provides insights into the income levels at each potential store location, which can help determine the most suitable location based on local income profiles. Moreover, age is crucial since younger, more active populations are more inclined to frequent convenience stores. This information allows for the identification of the predominant age group in each location, thereby aiding in the decision-making process for store placement. The dataset includes fields for age, income, and city.

However, upon analyzing the top-selling product categories, it became evident that personal care items are the most popular product category by sales volume. Personal care items are necessities that everyone must buy regardless of their income; they are essential goods needed for basic living, such as food, housing, healthcare, and other utilities. These goods are characterized by having inelastic demand, meaning their demand does not change significantly with changes in income or price. Consequently, despite having demographic data at the income level, it was deemed prudent to pay more attention to business condition indices along with population density and overall populations.

#### 3.2 Real time Local Business Condition Index

The Real-time Local Business Conditions Index (RTLBCI), as provided by Statistics Canada, serves as a critical piece of external data for 24Seven’s in determining the best location for their new store. This index offers real-time insights into business activity, tracking various economic indicators across multiple Canadian cities. Its relevance to 24Seven lies in the ability to understand and analyze business conditions and activity levels which can influence the success of a new convenient store.

By juxtaposing the Index across all potential locations, 24Seven can gain a nuanced perspective that may be pivotal in their decision-making process. This approach allows for a comparative analysis of economic activity and business vibrancy, which are essential factors when considering the viability and strategic fit of a new store location. Such data-driven insights can help in identifying areas with robust economic health, likely to support and sustain new business ventures.

#### 3.3 Weather Data

Severe weather conditions can discourage outdoor activities, which is detrimental for convenience stores that rely on regular foot traffic. People tend to shop in bulk to avoid frequent outings in extreme weather, which disadvantages convenience stores compared to regular stores. The weather dataset was thus obtained to assess the climatic conditions of each city. This information can provide insights into the best location based on weather patterns. The fields in this dataset cover city, province, postal code, average high and low temperatures for each month, and the amount of precipitation.

The goal is to holistically consider all these factors—geographical proximity to universities, demographic profiles, and weather conditions—to determine the most favorable location for the new 24Seven store.

## 4 Data Preprocessing and Relationship Mapping

In the foundational phase of the project, data integrity was upheld through meticulous preprocessing steps and appropriate relationship mapping (See [Appendix A.1](#)). These steps were pivotal in establishing a reliable baseline for analytical operations and visualizations.

### 4.1 Power Query Transformations

Before importing the datasets into Power BI, a Python API was used to convert the postal codes into longitude and latitude to allow for robust spatial analysis. Subsequently, every query underwent a rigorous process of header promotion and data type standardization to ensure computational accuracy across datasets. The power query steps performed include the following:

- Numeric data was assigned a ‘number’ data type, textual data was recognized as ‘text’, and dates were properly formatted to ‘date’ types.
- For customer files (**Customer.f**) and store files (**Stores.f**), uniformity was ensured by renaming column names to facilitate consistency across all queries. For example, ‘First Name’ was standardized to ‘FirstName’.
- Within the **Historical Sales** data, ‘Year’ was derived from ‘SaleDate’ to enhance temporal analysis. Additionally, a ‘Refresher tracker Query/table’ was created to keep the data up-to-date.
- The **Weather** dataset was cleansed of missing values across all columns, reinforcing the dataset’s completeness.
- In the **Unis.zip** dataset, duplicates and null values were removed from the primary key column, and city names were standardized (e.g., correcting ‘Montréal’ to ‘Montreal’) to maintain geographic consistency.
- Demographic data underwent a filtration process, removing null values and correcting any misentered data by filtering out or replacing with appropriate denominations.
- The **RTLBCI** dataset also had NULL values removed from all columns, ensuring data cleanliness.

### 4.2 Aggregation and Grouping

- For Year on Year (YOY) sales analysis, historical sales were grouped by ‘Year’ and ‘StoreKey’ to observe trends over time.
- Month on Month (MOM) analysis followed by grouping ‘Year’, ‘Month’, and ‘StoreKey’, allowing for discernment of short-term changes and seasonality.

## 5 Measures and Calculations

Measures were crafted to yield critical insights into customer and sales performance, serving as the cornerstone for decide the optimal location for the new store.

## 5.1 Calculated Measures

- Average Spend per Customer was determined by dividing the sum of 'Total Amount' in 'Historical Sales' by the count of 'CustomerKey', offering a metric of spending efficiency.
- Average Transaction per Customer was measured by counting 'SaleDate' occurrences and dividing them by the distinct count of 'CustomerKey', providing a gauge of customer engagement.
- Customer Life Time Value was computed using the average of 'Total Amount' in 'Sales-Aggregation-1', multiplied by the ratio of the count of 'CustomerKey' over its distinct count, thus quantifying long-term customer profitability.
- Repeat Customers and Returning Customers metrics were formulated using DAX calculations that account for customers with more than one purchase, delivering a percentage representation of the loyal customer base.
- MonthOverMonth Percentage Change and YoY Percentage Change were intricate calculations using DAX to evaluate temporal sales performance (revenue), adjusting for the specificities of each store and the relevant time frame.
- Revenue (ARR / MRR) - Average Revenue per store is calculated by summing the total revenue within a year (for ARR) or within a month (for MRR) across all stores and then dividing by the number of stores, providing a measure of revenue generation performance.
- Customer Growth - This metric is determined by calculating the percentage increase in the count of 'CustomerKey' from one period to the next, offering insights into the business's ability to attract new customers over time.
- New Paying Customers - The count of new 'CustomerKey' entries that are associated with transactions for the first time within a specific period, indicating the business's effectiveness in acquiring new customers.
- Number of Completed Transactions - Tracks Growth by tallying the total number of completed sales transactions in a given period, reflecting the overall activity and potential growth of the company.
- GMV Growth (Gross Merchandise Value) - Calculated by summing the total value of goods sold through the system over a year and comparing this with the same figure from the previous period to derive the growth percentage, indicating the increase or decrease in the total business volume.
- Forecasted Average Spend per Customer is calculated by dividing the forecasted sales by the number of forecasted customers. This metric is based on the data from the previous year (2023) and provides a forward-looking estimate of spending efficiency.
- Forecasted Customer Lifetime Value (CLTV) is derived by multiplying the Forecasted Average Spend per Customer by the Forecasted Transactions per Customer. This calculation projects the potential long-term profitability of each customer based on the anticipated frequency of transactions.

These calculated measures serve as the backbone of the KPIs, each offering a nuanced view into the facets of 24Seven's operations, from individual customer value to broad financial health of the existing stores.

## 6 Dashboard Layout and Visuals

The dashboard comprises five pages: Overview, Stores, Customers, External Data Analysis, and Forecasting. The priority goals mentioned previously and their respective KPIs are incorporated throughout these pages. Additionally, suitable visuals have been selected to clearly present information regarding the performance of existing stores across different geographical regions. Using slicers, stakeholders can customize their view according to their preferences, particularly in terms of geography, which aligns with the dashboard's ultimate purpose. A 'clear all slicers' button is featured on all pages to enable users reset the dashboard to its default state. A detailed breakdown of each page, the featured KPIs and visuals, and the associated slicers follows:

### 6.1 Overview Page

The purpose of the overview page is to succinctly depict the performance of the existing stores. Analyses leveraging external sources were excluded from this page, as it was deemed necessary to focus solely on information about the existing stores to better resonate with the decision-makers at 24Seven.

#### 6.1.1 KPIs

The page features the following KPIs:

- Total sales revenue
- Median age of customer
- Transactions processed
- Unique customers served
- Percentage of returning customers
- Average transaction size
- Customer lifetime value
- Business confidence
- Average transactions per customer

#### 6.1.2 Visuals

The page showcases the following visuals:

- A pie chart that depicts the distribution of customers by province
- A bar chart that shows the annual GMV growth
- A horizontal bar chart that displays the best-performing product categories

With these KPIs and visuals, the user gains insight into the current situation of the existing stores across Canada.



### 6.1.3 Slicers

To enhance the dashboard's applicability for its intended use, the aforementioned KPIs and visuals can be sliced by:

- Product category
- Store name
- Age group (lower bound and upper bound)
- Gender
- City and province – This is particularly important as it allows the user to compare performances across geographical regions.

## 6.2 Stores Page

The “Stores” page of the dashboard is dedicated to presenting Key Performance Indicators (KPIs) and visuals that focus on the sales and revenue priority goal. The page derives its name from the fact that it contains comparative KPIs across different regions, specifically analyzing the number of stores, as well as their individual sales and revenue contributions. This allows for a detailed comparison of the performance of each store within the company's portfolio.

### 6.2.1 KPIs

It features the following KPIs:

- Total number of stores
- Total sales revenue
- Average annual revenue per store
- Transactions processed
- Average daily transactions
- Best performing store
- Worst performing store
- A multi-KPI showing sales revenue by store (top four)
- Worst performing category
- Best performing category

### 6.2.2 Visuals

The Stores page showcases the following visuals:

- A map depicting the current store locations across Canada
- A table showing the percentage of returning customers
- A horizontal bar chart showing the transaction volume by city
- A bar chart showing the annual revenue by year

### 6.2.3 Slicers

The information on this page can be tailored using the featured slicers by:

- Product category
- Specific store name
- Gender
- Province and city

Using these slicers, sales and revenue can be compared across the current stores located across Canada, which will go a long way in determining the optimal location for the new store.

## 6.3 Customers Page

This page includes KPIs and visuals that inform on customer engagement and the demographics of the customer base. The featured KPIs include:

- The total number of Unique Customers Served, indicating the reach of the stores.
- Customer Lifetime Value, quantifying the long-term value derived from each customer.
- Median Age of Customer and Most Popular Age Group, providing demographic insights.
- Percentage of Returning Customers, highlighting customer loyalty.
- Average Transactions per Customer, shedding light on customer purchasing frequency.

### 6.3.1 Visuals

A multitude of visuals are featured on the page to offer insights into customer behavior and store performance:

- A bar chart which breaks down shopping habits by different age demographics.
- A table correlating the Age Range with the Demand Score, indicating the level of demand per demographic.
- A bar chart displaying the average spending per transaction for different age ranges.

### 6.3.2 Slicers

It features the same set of slicers as the customers page

## 6.4 External Data Analysis

This section presents KPIs and visuals that depict insights gleaned from the external data. The objective is to provide additional valuable insights about potential locations for the new store that cannot be inferred solely from the historical data at 24Seven. All KPIs and visuals on this page are aligned with the third priority goal: cities.

### 6.4.1 KPIs

The KPIs focus on climate factors that may influence foot traffic:

- **Warmest city** – This may positively correlate with foot traffic, assuming warmer climates encourage outdoor activity.
- **Coldest city** – This may negatively correlate with foot traffic, as colder temperatures could deter people from outdoor shopping.

### 6.4.2 Visuals

A variety of visuals are featured to provide insights on factors that may influence foot traffic and business performance in each region:

- A table displaying the population and population density of each province, offering demographic insights crucial for market size estimation.
- A table outlining the weather, including average temperatures (low and high) and precipitation, which can impact consumer shopping behavior.
- A table presenting the business condition index by city, giving an indication of the economic health and commercial vibrancy of each location.
- A horizontal bar chart comparing population density among cities, sorted in descending order to highlight the most densely populated areas.
- A multiline chart depicting the temporal trends of the local business condition index for all cities, providing an economic forecast to inform strategic planning.

### 6.4.3 Slicers

Reflecting the page's focus on geographic analysis, the information can be filtered by:

- Province
- City

These slicers allow for a detailed comparison of regions, aiding in the strategic decision-making process regarding the location of the new store.

## 6.5 Forecasting Page

This page supercharges the dashboard by providing decision-makers at 24Seven with the capability to forecast future sales and customer numbers, while also comparing these forecasts to the previous year's data. This functionality is invaluable in determining the best location for the new store.

### 6.5.1 KPIs

The KPIs featured on this page are geared towards assessing potential customer engagement at the prospective store location. These KPIs include:

- Forecasted average spend per customer
- Average spend by customer last year
- Forecasted customer lifetime value
- Customer lifetime value last year

### 6.5.2 Visuals

The visuals on this page aim to depict forecasted sales and the number of customers, as well as sales and customer numbers from the previous year. The visuals include four line charts:

- Forecasted sales by month compared to last year
- Forecasted number of customers by month compared to last year

### 6.5.3 Slicers

The slicers on this page enable scenario analysis, allowing users to see the impact of multiple scenarios on the forecasts. The featured slicers include:

- A date slicer to select the desired date range
- Percentage increase in sales
- Percentage increase in fixed cost
- Percentage increase in customers
- Transactions per customer

This functionality is powerful as it allows decision-makers to simulate various scenarios and assess their impact, enabling them to account for uncertainty in their decision-making process.

## 7 Leveraging the Dashboard

### 7.1 Comprehensive Business Insights

#### 7.1.1 Overview Page

This page of the report shows total sales revenue, unique customers served, and customer demographics. The inclusion of metrics like median age of customers and the percentage of returning customers helps in understanding the customer base and their loyalty. These metrics can be leveraged to tailor marketing strategies and loyalty programs. It also highlights the best and worst-performing stores and categories, the best store being Quebec City Center and the best product category being personal care, which can guide resource allocation and performance improvement plans. This section can be particularly helpful for identifying strengths to replicate across stores and areas that need attention. It also provides insights into year-over-year growth, allowing stakeholders to gauge the overall health of the company and project future growth trajectories as well as identifying the highest revenue-generating stores and product categories, which can influence inventory decisions and identify successful store models for potential new locations.

#### 7.1.2 Stores Page

The stores page tracks revenue trends, which is essential for forecasting and setting revenue targets. By showing the transaction volume by city, stakeholders can identify which locations have the most customer traffic and potentially adjust staffing and inventory levels accordingly. From this page, stakeholders can see that the Quebec City Center location is the best performing store while the Vancouver West location is the worst performing store. Stakeholders can also identify that personal care items perform the best while beverage items perform the worst.

### 7.1.3 Customers Page

The customers page breaks down customer data by gender and age group, providing insights into who the customers are and how they can be better served. The demand score and basket size by age group also offer a look at spending habits, which can help in product placement and stock decisions. This can guide personalized marketing and sales strategies to boost revenue from different customer segments. For example, this page shows that the median age of customers is between 55 and 64 years old. By identifying which products this age group tends to buy the most, stakeholders can ensure that they continue to sell products that attract this demographic.

### 7.1.4 External Data Analysis

The external data analysis page combines demographic data with weather patterns to understand external factors that might influence sales, such as population density and climate conditions, which could affect foot traffic. For example, it is expected that cities with more extreme weather conditions would have less foot traffic, such as Vancouver which has the highest average inches of precipitation. Additionally, it presents a real-time view of the business climate in various cities by using the Business Condition Index (BCI). The BCI serves as an aggregate indicator reflecting various economic and business-related factors such as employment rates, gross domestic product (GDP) growth, sales figures, and more. It is designed to provide a quick snapshot of the overall health of the business environment within a specific area. For stakeholders, the BCI is valuable for assessing economic stability and potential for growth. A higher index value suggests a favorable business climate, which might indicate a good time to invest, expand operations, or enter new markets. Conversely, a lower index value could signal caution, prompting a review of risk management strategies and potentially delaying expansion or large-scale investments.

Currently, Calgary has the highest business condition index while Halifax has the lowest. Identifying which cities have a strong business condition could influence where to prioritize opening new stores or increasing investment in marketing and inventory. The BCI can also help determine the optimal timing for launching new products or services, based on the overall business health in target markets. Finally, it can help to adjust resource allocation to match the business climate, by increasing staffing and stock in thriving markets, or conserving resources in less favorable conditions.

### 7.1.5 Forecasting Page

The forecasting page serves as a strategic forecasting platform, providing stakeholders with a predictive look into sales and customer trends for the upcoming year. Interactive controls allow for scenario planning, adjusting for projected sales growth, customer increases, and transaction frequencies, which are pivotal for making data-informed decisions regarding marketing, inventory, and operational planning. The juxtaposition of the current year's forecasts with the previous year's actuals offers a robust framework for setting targets and evaluating growth strategies. For example, currently the dashboard shows the highest number of customers and sales occurring in the month of December, which can be attributed to the holiday season, where consumer spending typically increases. For 24Seven, this could mean prioritizing inventory for high-demand products, preparing for increased foot traffic with adequate staffing, and launching holiday promotions to maximize revenue during this peak period. This trend also provides an opportunity to engage new customers and strengthen loyalty programs to enhance customer retention beyond the seasonal surge, ultimately contributing to an elevated Customer Lifetime Value (CLV) and a sustained increase in average spend per customer. This forward-looking analysis is crucial in shaping initiatives aimed at enhancing customer lifetime value and average spend per customer, thereby driving 24Seven's profitability and long-term success.

## 7.2 Strategic Expansion Recommendation for 24Seven

With the above being said, it is recommended that 24Seven opens their eleventh location in Toronto. This recommendation comes from the compelling insights drawn from the data.

Firstly, Ontario emerges as a significant province for sales, having a substantial proportion of the overall customer base. This lays a promising foundation for further expansion within the province. Specifically, Toronto distinguishes itself with the highest transaction volume. This is particularly notable given that Toronto, despite already having two 24Seven stores, supports a dense and populous metropolitan area with a strong potential customer flow.

Furthermore, the existing Toronto stores demonstrate a robust retention rate, with a high percentage of returning customers. The geographical positioning of these stores within the urban core is an asset, positioning 24Seven favorably in high-traffic areas conducive to the convenience store business model.

Additionally, the dashboard indicates that Toronto boasts the highest Customer Lifetime Value (CLV), a crucial indicator of long-term revenue potential from customers in the region.

Collectively, these data-driven insights present a strong case for Toronto as the optimal location for 24Seven's next venture, aligning with the company's growth objectives and the city's promising market dynamics.

# A Appendix

## A.1 Entity Relationship Diagram

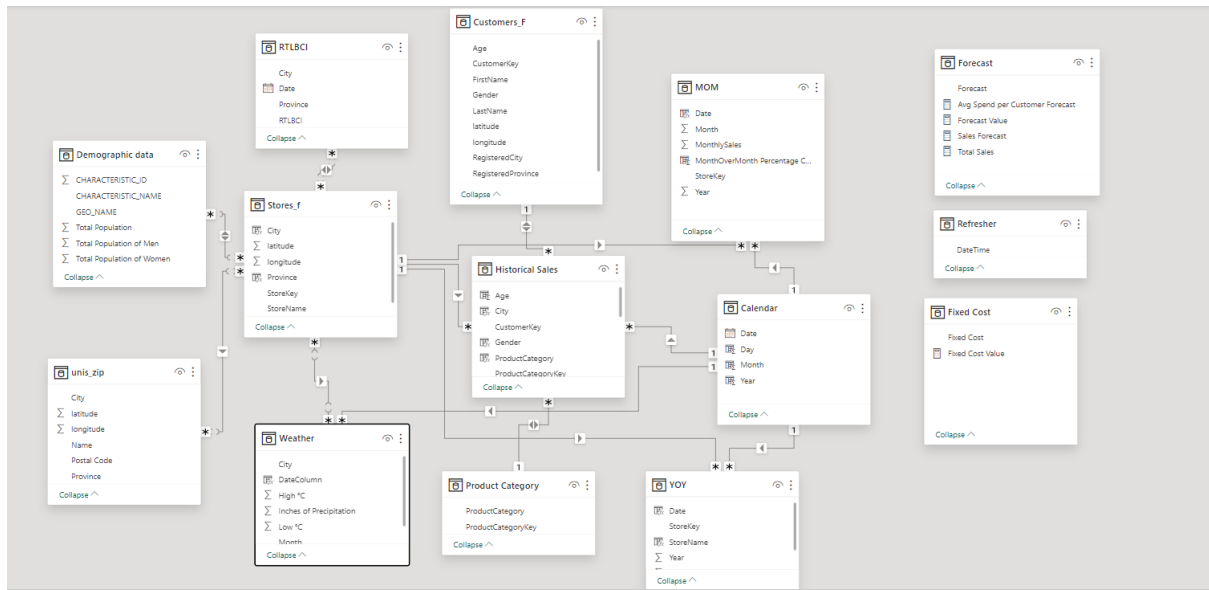


Figure 1: Entity Relationship Diagram

## B References

### References

- [1] Alasia, A., Newstead, N., & Hamit-Haggar, M. (2021, July 7). *Census of Population 2021*. Government of Canada, Statistics Canada. Available at: <https://www150.statcan.gc.ca/n1/pub/71-607-x/71-607-x2021017-eng.htm>
- [2] Government of Canada, Statistics Canada. (2022, June 14). *Real-time Local Business Conditions Index*. Census of Population. Available at: <https://www12.statcan.gc.ca/census-recensement/index-eng.cfm>