CUSTOMER EXPENDITURE DASHBOARD

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ABSTRACT :

Understanding customer's/people's behavior empowers producers to provide the right product or service, addressing their needs and desires, even when unexpressed. Proficiency in offering the right product to the right audience at the right time is crucial for effective marketing. To gain accurate insights into consumers' preferences, we aim to visualize their spending habits within the dashboard, identifying where the highest expenditures occur and the associated categories. Additionally, we'll examine whether consumer behavior shifts based on geography and location.

This dashboard is for data scientists and economists working for Corporate/Government to boost the economy, provide insights and analysis based on people spendings on various categories. Example, Insurance, Health Care, Food , etc. and for data scientists working for retail corporations, this can help with choosing the right location or provide insights on how people on different categories of food products.

INTRODUCTION:

During each visit to a supermarket or shopping service, occasions arise where we make unplanned purchases, acquiring items that were not initially on our shopping lists, often beyond what may be considered essential. This prompts the question: was it solely a consumer's decision to purchase these unexpected goods and services, or were external factors influential in driving these choices? Canada's stature as one of the world's largest consumer markets is well-known, with continuous transactions in the expansive retail sector. So, to address this question, we will harness the datasets "Household spending, Canada, regions and provinces"[1] and "Detailed food spending, Canada, regions and provinces"[2].

Our primary dataset will encompass data on household income and expenditures across Canada,detailing both essential necessities like electricity and water and retail purchases. Then we will delve deeper into retail purchases, offering insights into the retail prices from the second dataset[2]. The primary variables under scrutiny will include year, average retail price, product category, income, expenditure, and geographical location.

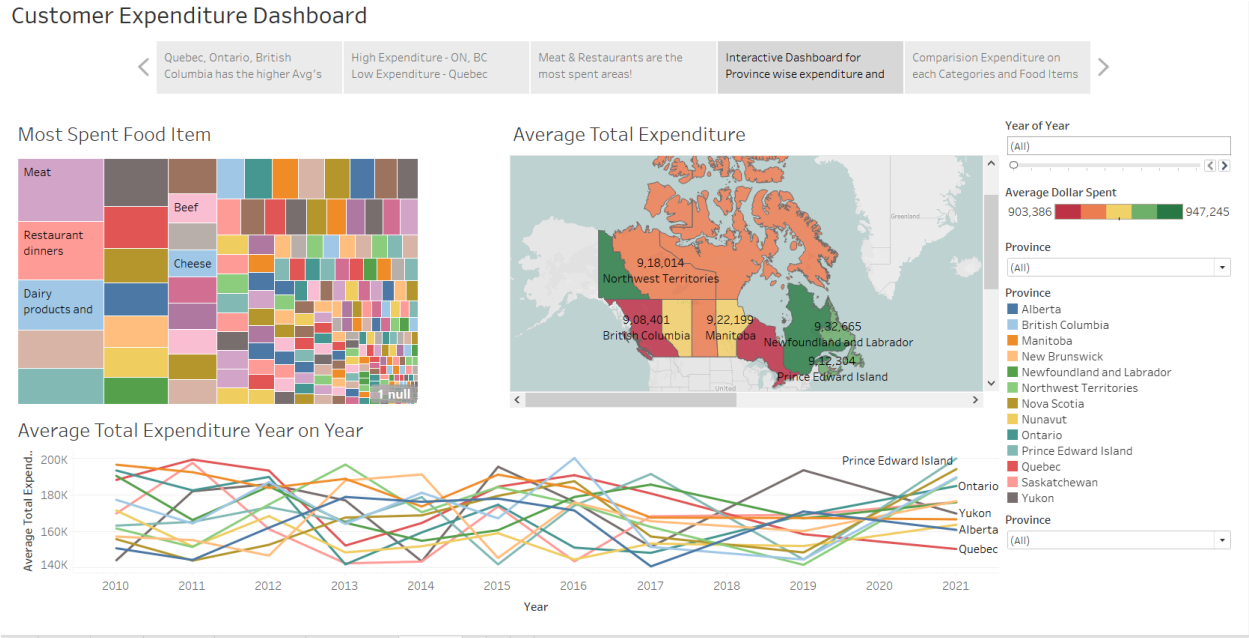
By combining data from “Monthly average retail prices for food and other selected products”[2] with “Household spending, Canada, regions and provinces”[1], we intend to explore the impact of geography and inflation on consumer behavior. Our analysis will encompass assessments of both regional variations and product categories, highlighting consumption patterns. Lastly, we acknowledge the influence of external factors on individual purchase choices. For instance, consumers may opt for a car or mobile phone with the same features as more expensive alternatives due to considerations like brand value or social status. Likewise, we will examine how income and spending relate.

As the initial dataset contained raw data, a preprocessing step was crucial to clean and impute missing values. Notably, provinces in the North West were absent, prompting the need for imputation. The imputation strategy involved leveraging both minimum and maximum values for missing data. To address the dataset's size and enhance clarity, certain categories were amalgamated; for instance, Private and Public Transportation were combined into a unified category named Transportation, and their averages were computed for meaningful representation and the process was repeated.

Motivation:

This particular dataset and these questions reflect my personal interests. I have an inherent curiosity and a strong desire to understand the inner workings of various systems. One specific area of interest for me is comprehending how cash circulates within a financial system. It's fundamental in finance to recognize that money should not remain stagnant; it must flow. People allocate their finances differently, which piqued my curiosity regarding what drives individuals to spend on particular products or categories and how they are influenced to do so.

DashBoard:



Purpose of the DashBoard:

This dashboard can be utilized by a variety of users according to their specific needs and requirements. Whether it is an economist assessing GDP, a policy maker seeking insights into the well-being of people across provinces to enhance their quality of life, a corporate entity

exploring new locations, or members of the general public, valuable information about the economy and expenditures can be accessed through this dashboard.

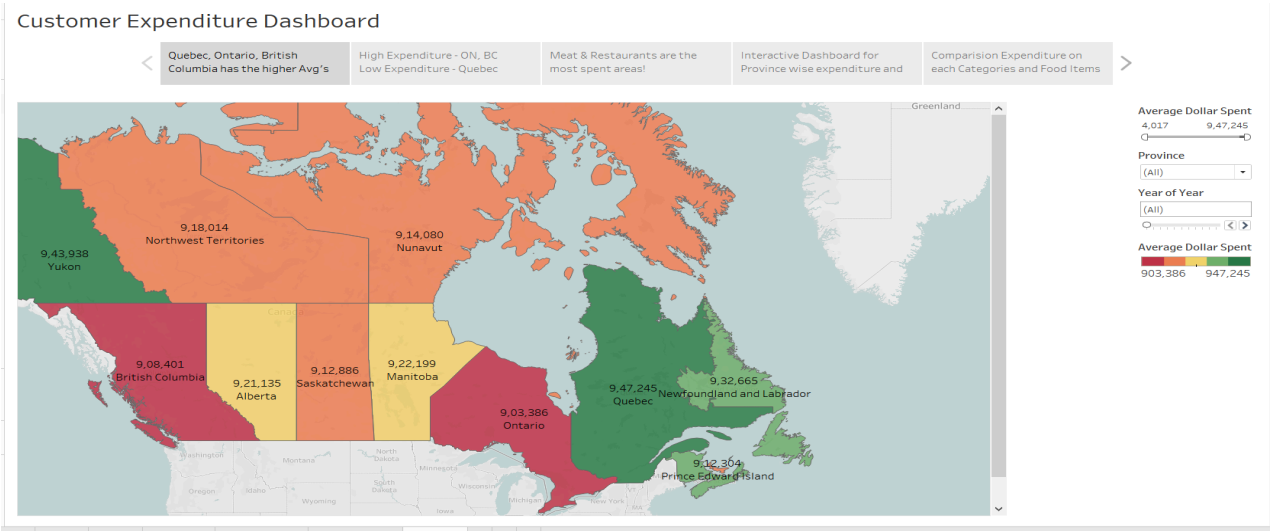
Summary of plots :

1. The Total Expenditure of all provinces, depicted in an actual map of Canada, is presented in the First Sheet. This information can be filtered based on year, average dollar spent, and the option to select multiple provinces.
2. On the Second Sheet, a year-on-year Total Expenditure line graph reveals hidden insights, which are further discussed in the later part of this report.
3. The Third Sheet features a bar plot illustrating Provinces and the Sum of all categories. This plot is customizable, allowing filtering based on year, categories of people spendings, and average dollar spent.
4. The Fourth Sheet displays a box plot indicating the most utilized food items across all provinces, which can be further filtered by year and province.
5. The 1st, 2nd, and 4th Sheets are employed to create an **interactive dashboard** designed to derive the insights necessary for analysis and decision-making. **The dashboard adopts a story narrative format, complemented by a top navigation bar.**
6. Lastly, there is an additional interactive dashboard that incorporates the bar plot from the 3rd Sheet and the box plot from the 4th Sheet. This dashboard facilitates data analysis between categories and food items spent

Dashboard Link : Customer Expenditure Dashboard

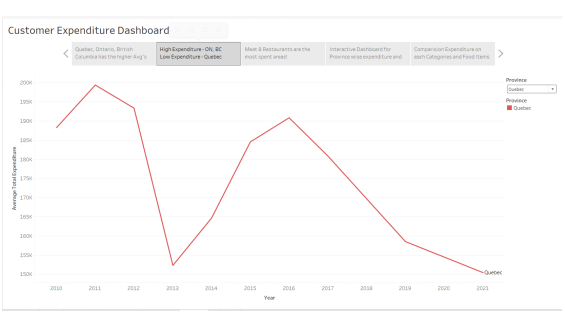
Insights:

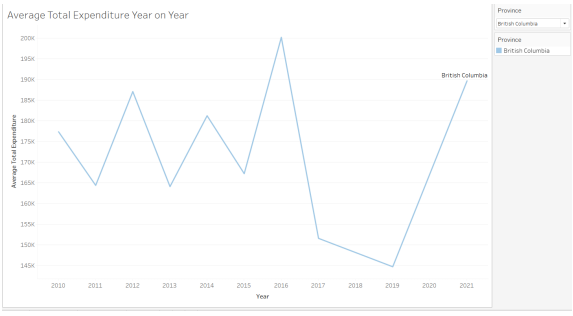
1. Higher expenditure is not necessarily indicative of a province's economic well-being; rather, it also signifies areas for improvement. Additionally, given the variation in population density among provinces, those with sparser populations exhibit higher averages compared to their densely populated counterparts. This contrast is particularly evident in Ontario, characterized by a dense population, and Nunavut, marked by a scarce population.

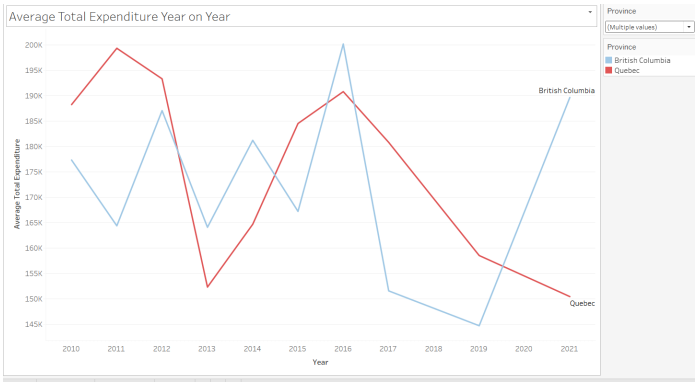


2. Ontario, British Columbia are at the lower end of total expenditure because these provinces have high population and since we have taken an average with total expenditure, hence its in the red zone but in reality **Ontario, British Columbia, Quebec** has the **highest average** total expenditure.
3. **Yukon, Northwest Territories** have **lower average**.
4. **Meat, restaurants, and dairy products & eggs** account for the highest expenditures across Canada..

5. The largest share of expenses is allocated to **Personal Insurance and Pension contributions**, followed by **income taxes and transportation**.
6. Another noteworthy finding is that a province with substantial expenditure may not necessarily be faring well economically. This observation is exemplified in Quebec. For instance, if one were contemplating opening a store branch based on map analysis, Quebec might seem like a promising location due to its overall highest average. However, a closer examination of the line graph depicting average total expenditure year on year reveals a decline in Quebec's spending. This decline could be attributed to changing spending patterns post-COVID or other significant factors.
7. In the image above, Quebec stands out with the highest overall average total expenditure. However, upon closer inspection of the year-on-year trends depicted in the subsequent images, it becomes evident that Quebec's total expenditure decreases over time, presenting a distinct pattern compared to that of British Columbia.







In this scenario, the analysis leads to the conclusion that BC is a preferable option compared to Quebec, given its consistently similar average total expenditure rate and a noticeable year-on-year growth trend.

Screenshots : Dashboard and Plot Screenshots Attached in a separate PDF

Reference:

Source : Data (statcan.gc.ca)

[1] - 1. Statistics Canada - Table 11-10-0222-01 Household spending, Canada, regions and provinces. 2. DOI: https://doi.org/10.25318/1110022201-eng

[2] - 1. Statistics Canada. Table 11-10-0125-01 Detailed food spending, Canada, regions and provinces **2. DOI:** https://doi.org/10.25318/1110012501-eng

For further deep analysis of Food expenditure in Canadian Provinces you can refer to the below dataset. (Note : Didn't use this in the dashboard)

[3] - 1. Statistics Canada - Table 18-10-0002-01 Monthly average retail prices for food and other selected products. 2. DOI: https://doi.org/10.25318/1810000201-eng