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| SQL GROUP PROJECT  CANADA – INTERPROVINCIAL & INTERNATIONAL TRADE FLOWS ANALYSIS |
| |  |  |  | | --- | --- | --- | | Group 3 | 12/9/24 | INFO8076 - Fall 2024 – Sec 4 | |

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**INTRODUCTION**

This project explores Canada’s economy over five years (2017-2021), focusing on changes in supply and demand across different sectors and products. The goal is to understand the country’s economic structure and find opportunities for future growth.

The years 2017 to 2021 are critical because they include the global COVID-19 pandemic, which disrupted economies worldwide. This period allows us to study how different sectors adapted to challenges and dealt with rapid changes during the pandemic.

The project will look at major contributors to supply and demand at a national level, identify trends, and highlight patterns. It will also provide a simple analysis of the economy and suggest strategies for planning, investments, and policies. By breaking down complicated economic data into easy-to-understand insights, this project aims to give a clear picture of Canada’s future financial challenges, opportunities, and potential.

**PROBLEM STATEMENT**

The problem is analyzing Canada’s interprovincial and international trade flows, introductory prices, and summary levels of data for 2017 to 2021. The project focuses on the contributions of goods, products, and services and identifies the country's top-performing sectors and product categories during the period. The team members who worked on this project aimed to find the top-performing product categories and sectors, compare their contributions in the group, and identify any critical or unique trends in the data, thus helping us to understand, identify and conclude which areas drive Canada’s economy for the time frame.

**DATA CLEANING**

**Source Reference** -[**https://www150.statcan.gc.ca/t1/tbl1/en/cv.action?pid=1210008801**](https://www150.statcan.gc.ca/t1/tbl1/en/cv.action?pid=1210008801)

The original dataset consisted of 58,197 rows and six columns, representing trade data aggregated at the product level across different provinces and territories in Canada. The columns included REF\_DATE (reference year), GEO (geographical region), DGUID (geographic identifier), Trade Flow Detail (type of trade activity), Product (product-level details), and VALUE (trade value). While comprehensive, the dataset contained rows irrelevant to the analysis and lacked the structure necessary for efficient querying and relational analysis.

To streamline the dataset, irrelevant rows were removed, reducing the size of the dataset from 58,197 rows to 11,602 rows. The data was then split into four distinct tables: Merchandise, Geography, Trades, and Canada Trade Flows, each serving a specific purpose in the relational data model. Unique identifiers were introduced to improve data referencing. Specifically, Geo\_ID was assigned to each geographical region in the Geography table, and Trade\_Code was assigned to each trade type in the Trades table. These identifiers ensure consistency and enable fast lookups across tables.

The Merchandise table provides detailed information about merchandise items, their categories (e.g., Goods, Services, or Products), and their associated industry types. The Geography table lists provinces and territories with unique identifiers for seamless integration with other tables. The Trade table defines the types of trade flows, such as imports and exports, with corresponding codes. Finally, the Canada Trade Flows table is the primary dataset, linking the other three tables through identifiers and providing trade values in Canadian dollars aggregated by year.

**ENTITY RELATIONSHIP DIAGRAM(ERD).**

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Using a star schema design, the schema provides a clear structure for analyzing Canada's trade flow data from 2017 to 2021. This consists of one central fact table connected to three-dimensional tables. Here's the breakdown:

**1. Fact Table: Canada\_Trade\_Flows**

* This table acts as the central hub, storing trade flow data with foreign keys linking it to the dimension tables.
* It contains quantitative data, such as **CAD\_in\_Millions** (trade values in Canadian dollars).
* The primary key is **S\_NO** (a serial number).
* By connecting detailed data to contextual information from dimension tables, this table supports comprehensive analysis.

**2. Dimensional Tables**

(A) **Geography Table**

* Stores information about geographical regions (e.g., provinces and territories).
* The primary key is **GEO\_ID**.

(B) **Trade Table**

* Contains data on types of trade flows, such as international imports and exports.
* The primary key is **TRADE\_CODE**.

(C) **Merchandise Table**

* Holds details about traded merchandise, categorized by goods, services, or products.
* The primary key is **MERCH\_CODE.**

**Star Schema Structure**

* The CANADA\_TRADE\_FLOWS fact table is surrounded by the GEOGRAPHY, TRADE, and MERCHANDIZE dimension tables, forming a **STAR SCHEMA**.
* This design allows for efficient querying and analysis by linking quantitative trade data to contextual details (e.g., region, trade type, merchandise).

**SQL QUERY OUTPUTS & INSIGHTS**

1. **To Display the Trends in Trade Values During the Year 2019 By Region.**

**Query:**

SELECT

C.Ref\_Year AS Year,

G.Geo\_Name AS Region,

SUM(CAST(C.CAD\_in\_Millions AS NUMERIC)) AS Total\_Trade\_Value

FROM

Canada\_Trade\_Flows C

INNER JOIN

Geography G ON C.Geo\_ID = G.Geo\_ID

WHERE

C.Ref\_Year = 2019

GROUP BY

C.Ref\_Year, G.Geo\_Name

ORDER BY

C.Ref\_Year, G.Geo\_Name;

**Output and Visualization:**

|  |  |  |
| --- | --- | --- |
| **year** | **region** | **total\_trade\_value** |
| 2019 | Alberta | 356990.9 |
| 2019 | British Columbia | 261223.8 |
| 2019 | Manitoba | 79971.5 |
| 2019 | New Brunswick | 57891.8 |
| 2019 | Newfoundland and Labrador | 41377 |
| 2019 | Nova Scotia | 45517.8 |
| 2019 | Nunavut | 5502.5 |
| 2019 | Ontario | 878780.5 |
| 2019 | Prince Edward Island | 8226.1 |
| 2019 | Quebec | 424646 |
| 2019 | Saskatchewan | 100846.6 |
| 2019 | Yukon | 2484.8 |

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**Insights –**

* The highest trade value in 2019 goes to **Ontario** province, with a value of around **$878,800.5 million CAD**. Ontario is a central economic hub contributing to Canada's overall trade.
* **Quebec** and **Alberta** are also significant contributors, with trade values of around $422,464 million CAD and $356,990.9 million CAD, respectively, for 2019.
* Other provinces had lower trade values in 2019. Thus, these provinces play a minor role in Canada's overall trade landscape.
* To summarize, the result from this query function provides a comprehensive understanding of Canada's trade landscape in 2019, and the data also highlights the dominant economic role of certain provinces while also revealing the relative trade contributions of the other regions.

1. **Display the Top 10 Products Contributing to The Trade Over the Years.**

**Query:**

SELECT

M.Merchandize\_Items AS Product,

SUM(CAST(C.CAD\_in\_Millions AS NUMERIC)) AS Total\_Trade\_Value

FROM

Canada\_Trade\_Flows C

INNER JOIN

Merchandize M ON C.Merch\_Code = M.Merch\_Code

GROUP BY

M.Merchandize\_Items

ORDER BY

Total\_Trade\_Value DESC

LIMIT 10;

**Output:**

|  |  |
| --- | --- |
| **product** | **total\_trade\_value** |
| Transportation equipment | 777890.2 |
| Mineral fuels | 767844.9 |
| Food and non-alcoholic beverages | 718595.1 |
| Transportation and related services | 609414.7 |
| Wholesale margins and commissions | 607701.8 |
| Primary metallic products | 568413.2 |
| Chemical products | 568078.6 |
| Professional services | 461621.4 |
| Other finance and insurance | 430268.4 |
| Administrative and support, head office, and waste management services | 413581.1 |

**Insights:**

* The results indicate that transportation-related industries majorly contribute to Canada's overall trade activities.
* **Transportation Equipment** ranks top with a $778,890.2 million CAD trade value**.**
* The second and third highest-value products are **Mineral fuels** and **Food and non-alcoholic beverages, with the trade value of $767,844.9 million CAD and $718,595.1 million CAD,** respectively.
* Other significant product categories, such as Primary metallic products, Chemical products, and Professional services, clearly indicate the diverse nature of Canada's trade landscape.
* To summarize, the results from this query function provide valuable information to the **policymakers, industry analysts**, and **businesses** who wish to identify the most influential sectors and make informed decisions about trade strategies and investment priorities accordingly.

1. **To Display the Regional Trade Value Differences Over the Years.**

**Query:**

SELECT

G.Geo\_Name AS Region,

SUM(CAST(C.CAD\_in\_Millions AS NUMERIC)) AS Total\_Trade\_Value

FROM

Canada\_Trade\_Flows C

INNER JOIN

Geography G ON C.Geo\_ID = G.Geo\_ID

GROUP BY

G.Geo\_Name

ORDER BY

Total\_Trade\_Value DESC;

**Output and Visualization:**

|  |  |
| --- | --- |
| **region** | **total\_trade\_value** |
| Ontario | 4244393.5 |
| Quebec | 2070784.5 |
| Alberta | 1723163.4 |
| British Columbia | 1274618.4 |
| Saskatchewan | 496062.8 |
| Manitoba | 393327.2 |
| New Brunswick | 283256.7 |
| Nova Scotia | 219223.6 |
| Newfoundland and Labrador | 185352.1 |
| Prince Edward Island | 40713.2 |
| Nunavut | 26395.1 |
| Yukon | 13035.8 |

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**Insights:**

* The results showcase that **Ontario** has the highest total trade value, reaching around **$4,244,393.5 million CAD** over time.
* **Quebec** and **Alberta** are the following two highest-ranking provinces, with trade values of around **$2,070,784.5 CAD** and **$1,723,163.4 trillion CAD**, respectively.
* The remaining provinces have lower trade values ranging from around **$13,035.8 million CAD** to $**1,274,618.4 million CAD**.
* To summarize, the results from this query function offer a robust and insightful analysis of Canada's regional trade landscape, providing a valuable analysis for stakeholders interested in understanding and shaping the country's economic future.

1. **Comparison Of Economic Changes Between Goods & Services Over The Years.**

**Query:**

SELECT

C.Ref\_Year AS Year,

SUM(CASE

WHEN M.Category = 'Goods' THEN CAST(C.CAD\_in\_Millions AS NUMERIC)

ELSE 0

END) AS Goods\_Trade\_Value,

SUM(CASE

WHEN M.Category = 'Services' THEN CAST(C.CAD\_in\_Millions AS NUMERIC)

ELSE 0

END) AS Services\_Trade\_Value

FROM

Canada\_Trade\_Flows C

INNER JOIN

Merchandize M ON C.Merch\_Code = M.Merch\_Code

GROUP BY

C.Ref\_Year

ORDER BY

C.Ref\_Year;

**Output & Visualization:**

|  |  |  |
| --- | --- | --- |
| **year** | **goods\_trade\_value** | **services\_trade\_value** |
| 2017 | 753727.8 | 752623.4 |
| 2018 | 788618.9 | 794139.3 |
| 2019 | 804273.4 | 835142.9 |
| 2020 | 723332.2 | 758391 |
| 2021 | 802191.1 | 846215.5 |

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**Insights:**

* The results showcase that the trade value for **services** has generally been higher than the trade value for **goods** from the year **2018** onwards.
* However, the goods and services trade values had significant fluctuations over the years, with a notable drop in the trade value in **2020**, likely due to the **COVID-19** pandemic's impact on the economy.
* The result also highlights a sharp increase in the trade value for goods and services in **2021**, which suggests a potential recovery or growth in Canada's trade activities during the **COVID-19 pandemic**.
* To summarize, the results from this query function provide a comprehensive understanding of the trends and variations in Canada's trade landscape, specifically the differences between goods and services over the period and help the stakeholders who are interested in understanding and navigating the country's evolving trade landscape.

1. **To Display The Total Count, Sum & Average Of Each Trade Type Over The Years.**

**Query:**

SELECT

T.Trade\_Type,

COUNT(C.Trade\_Code) AS Total\_Trade\_Transactions,

SUM(CAST(C.CAD\_in\_Millions AS NUMERIC)) AS Trade\_Values,

ROUND(SUM(CAST(C.CAD\_in\_Millions AS NUMERIC)) / COUNT(C.Trade\_Code), 2) AS Average\_Trade\_Values

FROM

Canada\_Trade\_Flows C

INNER JOIN

Trades T ON C.Trade\_Code = T.Trade\_Code

GROUP BY

T.Trade\_Type

**Output & Visualization:**

|  |  |  |  |
| --- | --- | --- | --- |
| **trade\_type** | **total\_trade\_transactions** | **trade\_values** | **average\_trade\_values** |
| International Exports | 2752 | 3358181.2 | 1220.27 |
| Interprovincial imports | 2995 | 2035037.7 | 679.48 |
| International re-exports | 116 | 2904.5 | 25.04 |
| Interprovincial exports | 2885 | 2042880.5 | 708.1 |
| International Imports | 2854 | 3531322.4 | 1237.32 |

**A graph of a number of transactions by type

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**Insights:**

* The above result shows the volumes of different trade activities, which can provide essential patterns about Canada's economic landscape and trade dynamics on an economic level during the period.
* Looking at the numbers from the visual representation of the result, **interprovincial imports** have the highest volume at **2,995 transactions,** suggesting a significant level of trade activity between different provinces or territories within Canada.
* The second highest volume is for **interprovincial exports** at **2,885 transactions,** which complements and indicates a robust trade flow between regions.
* **International imports** come in third place with **2,854 transactions; international exports** are the fourth highest at **2,752**. This points to the importance of foreign trade and the country's engagement with the global economy by importing and exporting goods and materials.
* **International re-exports** have a much lower volume at only **116 transactions**. The low number implies that this trade activity is relatively limited compared to the other categories.
* To summarize, the results from this query reveal that interprovincial and international trade are significant, with imports and exports playing important complementary roles. Such results help in understanding trade flow patterns ultimately helping in informing policymaking, business strategies, and economic planning efforts.

1. **To Display Total Trade Value Variations Over The Years by Region.**

**Query:**

SELECT

COALESCE(G.Geo\_Name, 'Total') AS Region,

SUM(CASE WHEN C.Ref\_Year = 2017 THEN CAST(C.CAD\_in\_Millions AS NUMERIC) ELSE 0 END) AS "2017",

SUM(CASE WHEN C.Ref\_Year = 2018 THEN CAST(C.CAD\_in\_Millions AS NUMERIC) ELSE 0 END) AS "2018",

SUM(CASE WHEN C.Ref\_Year = 2019 THEN CAST(C.CAD\_in\_Millions AS NUMERIC) ELSE 0 END) AS "2019",

SUM(CASE WHEN C.Ref\_Year = 2020 THEN CAST(C.CAD\_in\_Millions AS NUMERIC) ELSE 0 END) AS "2020",

SUM(CASE WHEN C.Ref\_Year = 2021 THEN CAST(C.CAD\_in\_Millions AS NUMERIC) ELSE 0 END) AS "2021"

FROM

Canada\_Trade\_Flows C

INNER JOIN

Geography G ON C.Geo\_ID = G.Geo\_ID

GROUP BY

ROLLUP(G.Geo\_Name)

ORDER BY

G.Geo\_Name;

**Output:**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **region** | **2017** | **2018** | **2019** | **2020** | **2021** |
| Alberta | 321154.2 | 350016.3 | 356990.9 | 301761.2 | 393240.8 |
| British Columbia | 239694.7 | 256110.6 | 261223.8 | 237533.1 | 280056.2 |
| Manitoba | 74982.5 | 77842.7 | 79971.5 | 75367.1 | 85163.4 |
| New Brunswick | 56480.4 | 57208.7 | 57891.8 | 49646 | 62029.8 |
| Newfoundland and Labrador | 34536.4 | 39503.9 | 41377 | 32562.3 | 37372.5 |
| Nova Scotia | 41420.4 | 43030.6 | 45517.8 | 41587.3 | 47667.5 |
| Nunavut | 3989.5 | 4682.8 | 5502.5 | 5746.5 | 6473.8 |
| Ontario | 807435.5 | 847660.2 | 878780.5 | 811063 | 899454.3 |
| Prince Edward Island | 7687 | 7937.7 | 8226.1 | 7789 | 9073.4 |
| Quebec | 389864.8 | 414404.8 | 424646 | 392447.8 | 449421.1 |
| Saskatchewan | 94348.1 | 99558.8 | 100846.6 | 91295 | 110014.3 |
| Yukon | 2388.4 | 2568.1 | 2484.8 | 2515.8 | 3078.7 |
| **Total** | **2073981.9** | **2200525.2** | **2263459.3** | **2049314.1** | **2383045.8** |

**Insights:**

* The results show trade value figures for various Canadian provinces and territories from 2017 to 2021, allowing us to examine the economic trends and performances across different regions over the 5-year period.
* Ontario is the largest province in terms of trade value, and its trade value has steadily increased from $807,435.5 million CAD in 2017 to $899,454.3 million CAD in 2021. this consistent growth indicates the province’s economy has been relatively strong and robust.
* The next largest province in terms of trade value is **Quebec**, having its trade value rise, but at a slower pace - from **$389,864.8 million CAD in 2017** to **$449,421.1 million CAD in 2021,** suggesting that Quebec's economic expansion may have been more moderate compared to Ontario's.
* Moving westward, **Alberta** is the third largest province by trade value. Its economy has shown robust expansion, with trade value climbing from **$321,154.2 million CAD in 2017** to **$393,240.8 million CAD in 2021**. This outpaces Ontario's and Quebec's growth rates, hinting at Alberta’s economic dynamism.
* The data also provides insights into Canada's **smaller provinces** and **territories**.
* To summarize, the results from this query unfold economic trends which can help policymakers, businesses, and residents to have a better understanding of the unique dynamics which shape different parts of the country and help them identify key areas of strength, weakness, and change which can inform and develop strategic investments, economic development initiatives, and other decisions.

1. **To Display The Total Count Of Products Traded by Region.**

**Query:**

SELECT

G.Geo\_Name AS Region,

COUNT(DISTINCT M.Merch\_Code) AS Product\_Count

FROM

Canada\_Trade\_Flows C

INNER JOIN

Geography G ON C.Geo\_ID = G.Geo\_ID

INNER JOIN

Merchandize M ON C.Merch\_Code = M.Merch\_Code

GROUP BY

G.Geo\_Name

ORDER BY

Product\_Count DESC;

**Output:**

|  |  |
| --- | --- |
| **region** | **product\_count** |
| Ontario | 56 |
| British Columbia | 52 |
| Manitoba | 52 |
| New Brunswick | 52 |
| Newfoundland and Labrador | 52 |
| Nova Scotia | 52 |
| Alberta | 52 |
| Saskatchewan | 52 |
| Yukon | 52 |
| Quebec | 52 |
| Prince Edward Island | 50 |
| Nunavut | 49 |

**Insights:**

* The results provide some interesting insights about the overall distribution of product counts across different provinces in Canada.
* **Ontario** has the highest product count at **56**, indicating that the province has the widest variety of product trade portfolio, whereas Nunavut has the fewest products traded at 49, indicating a more limited set of traded goods and services.
* Some of the provinces have the exact product count, which is 52,and this symmetry indicates some similarities in the economic profiles and trade patterns of these provinces.
* To summarize, the results from this query provide a high-level snapshot of the geographical distribution of traded products across Canada, and these results and insights help develop a better understanding of the complexity and nuances of the country's trade landscape.

1. **To Display The Total Trade Values & Its Contribution In Percentage Specifically For British Columbia & Newfoundland and Labrador.**

**Query:**

WITH Trade\_Type\_Percentage AS (

SELECT

G.Geo\_Name AS Region,

T.Trade\_Type AS TradeType,

SUM(CAST(C.CAD\_in\_Millions AS NUMERIC)) AS Total\_Trade\_Value,

ROUND(

(SUM(CAST(C.CAD\_in\_Millions AS NUMERIC)) \* 100.0) /

(SELECT SUM(CAST(CAD\_in\_Millions AS NUMERIC))

FROM Canada\_Trade\_Flows C2

INNER JOIN Geography G2 ON C2.Geo\_ID = G2.Geo\_ID

WHERE G2.Geo\_Name = G.Geo\_Name),

2

) AS Contribution\_Percentage

FROM

Canada\_Trade\_Flows C

INNER JOIN

Geography G ON C.Geo\_ID = G.Geo\_ID

INNER JOIN

Trades T ON C.Trade\_Code = T.Trade\_Code

WHERE

G.Geo\_Name IN ('British Columbia', 'Newfoundland and Labrador')

GROUP BY

G.Geo\_Name, T.Trade\_Type

)

SELECT

Region, TradeType, Total\_Trade\_Value, Contribution\_Percentage

FROM

Trade\_Type\_Percentage

ORDER BY

Region, Contribution\_Percentage DESC;

**Output and Visualization:**

|  |  |  |  |
| --- | --- | --- | --- |
| **region** | **tradetype** | **total\_trade\_value** | **contribution\_percentage** |
| British Columbia | International Imports | 395558.4 | 31.03 |
| British Columbia | International Exports | 356755.9 | 27.99 |
| British Columbia | Interprovincial imports | 303574.2 | 23.82 |
| British Columbia | Interprovincial exports | 218539.1 | 17.15 |
| British Columbia | International re-exports | 190.8 | 0.01 |
| **region** | **tradetype** | **total\_trade\_value** | **contribution\_percentage** |
| Newfoundland and Labrador | International Exports | 71872.9 | 38.78 |
| Newfoundland and Labrador | International Imports | 50628.1 | 27.31 |
| Newfoundland and Labrador | Interprovincial imports | 42618 | 22.99 |
| Newfoundland and Labrador | Interprovincial exports | 20210.8 | 10.9 |
| Newfoundland and Labrador | International re-exports | 22.3 | 0.01 |

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**Insights:**

* The results provide a trade value breakdown for Newfoundland and Labrador & British Columbia, Canada's easternmost and westernmost provinces.
* The data shows that **international exports** account for the largest share of Newfoundland & Labrador's total trade value, comprising **38.78%** of the total share, indicating that the province heavily relies on exporting goods and services to international markets beyond the country’s borders. Whereas for British Columbia, **international exports** account for **27.99%** of the total share suggesting a balanced trade profile compared to its counterpart’s heavier reliance on exports.
* British Columbia's most significant trade value component is **international imports**, making up **31.03%** of the total share of the trade value. International **imports** make up the second largest portion at **27.31%** of the total share for Newfoundland and Labrador, indicating a significant trade relationship with other countries.
* **Interprovincial imports and exports** contribute around **22.99%** and **10.9%** to the total share, suggesting that Newfoundland & Labrador has a more modest level of trade integration with other Canadian provinces. For British Columbia, **interprovincial imports and exports** contribute around **23.82%** and **17.15%**, respectively, indicating a more substantial level of economic integration with other Canadian provinces.
* To summarize, the results from this query reveal that geographical location and resource endowments play a significant role in shaping the province’s trade patterns. The differences in trade value compositions may also reflect these two provinces' underlying economic structures and industry specializations.

1. **To Display The Top 3 Provinces for International Exports In Each Year.**

**Query:**

SELECT

Year,

Province,

Total\_Trade\_Value,

Rank

FROM (

SELECT

C.Ref\_Year AS Year,

G.Geo\_Name AS Province,

SUM(CAST(C.CAD\_in\_Millions AS NUMERIC)) AS Total\_Trade\_Value,

RANK() OVER (PARTITION BY C.Ref\_Year ORDER BY SUM(CAST(C.CAD\_in\_Millions AS NUMERIC)) DESC) AS Rank

FROM

Canada\_Trade\_Flows C

INNER JOIN

Geography G ON C.Geo\_ID = G.Geo\_ID

INNER JOIN

Trades T ON C.Trade\_Code = T.Trade\_Code

WHERE

T.Trade\_Type = 'International Exports' -- Filter for International Exports only

GROUP BY

C.Ref\_Year, G.Geo\_Name

) AS ranked\_trades

WHERE

Rank <= 3 -- Only top 3 provinces

ORDER BY

Year, Rank;

**Result:**

|  |  |  |  |
| --- | --- | --- | --- |
| **year** | **province** | **total\_trade\_value** | **rank** |
| 2017 | Ontario | 264488.3 | 1 |
| 2017 | Quebec | 112194.1 | 2 |
| 2017 | Alberta | 103007.5 | 3 |
| 2018 | Ontario | 276554 | 1 |
| 2018 | Quebec | 121100.9 | 2 |
| 2018 | Alberta | 115490.2 | 3 |
| 2019 | Ontario | 291476.7 | 1 |
| 2019 | Alberta | 122747.2 | 2 |
| 2019 | Quebec | 122129 | 3 |
| 2020 | Ontario | 264016.7 | 1 |
| 2020 | Quebec | 112784.7 | 2 |
| 2020 | Alberta | 92252.6 | 3 |
| 2021 | Ontario | 288107.8 | 1 |
| 2021 | Alberta | 145361.2 | 2 |
| 2021 | Quebec | 128305.8 | 3 |

**Insights:**

* The result represents the total trade value rankings for the top 3 exporting provinces each year.
* **Ontario**, **Quebec**, and **Alberta** have consistently been the **top 3** provinces for international exports, suggesting that these three provinces have well-established export-oriented industries and vigorous trade relationships with international markets.
* While the top 3 provinces remain the same, their ranking orders fluctuate yearly. In **2017, 2018** and **2020,** the ranking was **Ontario, Quebec, and Alberta, but in 2019 and 2021, the ranking changed to Ontario, Alberta, and Quebec.** These shifting rank orders showcase that each province's relative competitiveness and economic conditions change over time, impacting their export performance.
* To summarize, the results from this query reveal broader shifts in Canada's overall trade patterns, trade partnerships, and economic priorities, along with providing insights that could inform national-level trade policies and strategies.

1. **To Display The Total Trade Value of Each Province Over The Years Into Categorical Trade Bins (Low, Medium, High)**

**Query:**

WITH Cumulative\_Trade AS (

SELECT

G.Geo\_Name AS Province,

SUM(CAST(C.CAD\_in\_Millions AS NUMERIC)) AS Total\_Trade\_Value

FROM

Canada\_Trade\_Flows C

INNER JOIN

Geography G ON C.Geo\_ID = G.Geo\_ID

GROUP BY

G.Geo\_Name

)

SELECT

Province,

Total\_Trade\_Value,

WIDTH\_BUCKET(Total\_Trade\_Value, 0, 10000000, 3) AS Trade\_Bin,

CASE

WHEN WIDTH\_BUCKET(Total\_Trade\_Value, 0, 10000000, 3) = 1 THEN 'Low Trade'

WHEN WIDTH\_BUCKET(Total\_Trade\_Value, 0, 10000000, 3) = 2 THEN 'Medium Trade'

WHEN WIDTH\_BUCKET(Total\_Trade\_Value, 0, 10000000, 3) = 3 THEN 'High Trade'

END AS Trade\_Category

FROM

Cumulative\_Trade

ORDER BY

Total\_Trade\_Value DESC;

**Output:**

|  |  |  |  |
| --- | --- | --- | --- |
| **province** | **total\_trade\_value** | **trade\_bin** | **trade\_category** |
| Ontario | 4244393.5 | 2 | Medium Trade |
| Quebec | 2070784.5 | 1 | Low Trade |
| Alberta | 1723163.4 | 1 | Low Trade |
| British Columbia | 1274618.4 | 1 | Low Trade |
| Saskatchewan | 496062.8 | 1 | Low Trade |
| Manitoba | 393327.2 | 1 | Low Trade |
| New Brunswick | 283256.7 | 1 | Low Trade |
| Nova Scotia | 219223.6 | 1 | Low Trade |
| Newfoundland and Labrador | 185352.1 | 1 | Low Trade |
| Prince Edward Island | 40713.2 | 1 | Low Trade |
| Nunavut | 26395.1 | 1 | Low Trade |
| Yukon | 13035.8 | 1 | Low Trade |

**Insights:**

* The result displays the total trade value for each province and the corresponding "trade\_bin" category, allowing us to understand the relative scale and positioning of the provinces' trade activities and the nature of their trade profiles.
* **Ontario** is the clear leader, with a total trade value of **$4,244,393.5 million CAD.** This massive figure suggests that Ontario is the economic powerhouse of Canada, with its diverse industries, strong infrastructure, and deep global trade connections.
* **Quebec** comes in second with a total trade value of **$2,070,784.5 million CAD**, suggesting that Quebec also plays a significant role in Canada's overall trade landscape. Alberta ranks third with a total trade value of $1,723,163.4 million CAD, followed by British Columbia at $1,274,618.4 million CAD, indicating that these western provinces demonstrate their economic weight and trade prominence.
* The remaining provinces have lower total trade values, ranging from around **$13,000 million CAD** to **$500,000 million CAD.**
* To summarize, the result from this query provides a comprehensive understanding of the trade landscape in Canada, and the data also reveals stark disparities in the scale and nature of trade activities across the provinces.

1. **To Display The Total Trade Value For Each Industry Type For International Exports In The Alberta Province Over The Years.**

**Query:**

SELECT

M.Industry\_Type AS Industry,

SUM(CAST(C.CAD\_in\_Millions AS NUMERIC)) AS Total\_Trade\_Value

FROM

Canada\_Trade\_Flows C

INNER JOIN

Geography G ON C.Geo\_ID = G.Geo\_ID

INNER JOIN

Trades T ON C.Trade\_Code = T.Trade\_Code

INNER JOIN

Merchandize M ON C.Merch\_Code = M.Merch\_Code

WHERE

G.Geo\_Name = 'Alberta'

AND T.Trade\_Type = 'International Exports'

GROUP BY

M.Industry\_Type

**Result:**

|  |  |
| --- | --- |
| **industry** | **total\_trade\_value** |
| Agriculture and Natural Resources | 345547.4 |
| Construction and Real Estate | 3244.6 |
| Energy and Utilities | 473.6 |
| Health, Hospitality, and Government Services | 7269.4 |
| Knowledge and Education | 6382.7 |
| Manufacturing | 125257.7 |
| Trade and Financial Services | 41089.4 |
| Transportation and Communication | 49593.9 |

**Insights:**

* The result showcases the total trade values for various industry categories in Alberta, offering valuable perspectives on the structure and drivers of the province's overall trade activities.
* **Agriculture and Natural Resources, Manufacturing**, **Transportation and Communication** and **Trade and Financial Services** industries have the highest trade values of **$343,547.4 million CAD**, **$125,257.7 million CAD**, **$49,559.9 million CAD** and **$41,089.4 million CAD,** respectively. This suggests these industries are essential in driving Alberta's export and trade performance.
* **Health, Hospitality, and Government Services, Knowledge and Education, Construction and Real Estate** and **Energy and Utilities** report the lowest trade values of **$7,269.4 million CAD, $6,382.7 million CAD, $3,244.6 million CAD** and **$473.6 million CAD**, respectively, suggesting that these industries represent more domestically focused services.
* To summarize, the result from this query showcases a relative magnitude of these trade values, developing a better understanding of the economic structure and trade specializations within Alberta.

**CONCLUSION**

This project highlights Canada's economic landscape, with Ontario standing out as the interprovincial and international trade leader. Ontario's large trade volumes in imports and exports showcase its strong economic position.

Quebec follows closely, ranking second in overall trade value and showing steady growth in its trade activities. Alberta, known for its resources, experienced more ups and downs but demonstrated resilience by returning from the pandemic-related dip in 2020.

The comparison of interprovincial and international trade flows provides valuable insights. High levels of trade between Canada’s regions highlight the country’s strong internal economic connections and the importance of policies that promote seamless commerce across provinces. On the other hand, Canada’s significant international trade—importing raw materials and exporting finished goods—reflects its deep integration into the global market as both a producer and consumer.

This analysis offers clear, data-driven insights to support evidence-based decisions for stakeholders. The findings aim to help develop strategies that encourage economic growth, improve Canada’s trade resilience, and strengthen its position in the global trading system.