BATTLE OF THE NEIGHBORHOODS -IBM PROJECT

BY OBEHI AGBONENI

INTRODUCTION /BUSSINESS PROBLEM

This is written to help a European based courier company looking gain entrant into North America beginning with Canada. They are headquartered in the United Kingdom and have presence in most part of Europe. Their services are segmented into freight and courier. To penetrate the Canadian market, they are undecided between leading with either Toronto or Calgary, as jointly, these cities command the biggest market in Canada. Due to limited knowledge of this market, they have contacted us to provide information that will help the selection of a best-case city and possibly a preferred city for operations.

Our engagement with them shows that the following criteria will be key to deciding a preferred city;

City with the best base tax rate bracket

Best contributor to national GDP

Higher GDP

Higher total population

These criteria have been provided on the back of indices that have been important to their success in their current market. Our Objective is to locate neighbourhoods that meet the criteria and recommend a best-case to the company and the target audience. The information received from this study will help the company decide on a city to commence their operations by providing required data about a host of cities. Also, the information received would also help other same kind businesses considering the Canadian courier market.

DATA DESCRIPTION

The information needed by the client will be obtained from the following sources;

1. Canada Income tax & provincial tax by Wikipedia: This provides specific details about personal income and corporate tax. The information is provided by the Federal Tax Rates 2020 and Wikipedia. Wikeipedia referenced the following sources; Canada Revenue Agency,2018 Federal Personal Income Tax Rates, Corporate Tax Rate and the Fiscal Reference Tables October 2018.The information collated include tax bracket per each province for 2020. This will be useful in comparing the tax requirement of Ontario and Alberta.

2. Canada GDP contribution by Wikipedia: This information originated from statistics Canada and the department of Finance Canada. The information shows us the percentage contribution as well absolute figure of the GDP contribution of each province.

3. Population per province and city: The information provided was on the back of the 2016 census and the Interprovincial migration. This help us determine the average population of cities and decide on those that meet our criteria

4. Road network: This shows us the size of the road network in a city. This information will help determine the accessibility of a city. This will be important in the courier and freight business.

5. Foursquare API : To collect location data about competitors in the preferred location

Tax Rate Review

	provinces	taxratesCod
0	Newfoundland and Labrador	8.7% on the first $37,929 of taxable income, +..
1	Prince Edward Island	9.8% on the first $31,984 of taxable income, +..
2	Nova Scotia	8.79% on the first $29,590 of taxable income, ..
3	New Brunswick	9.68% on the first $43,401 of taxable income, ..
4	Quebec	Go to Income tax rates (Revenu Québec Web site)
5	Ontario	5.05% on the first $44,740 of taxable income, ..
6	Manitoba	10.8% on the first $33,389 of taxable income, ..
7	Saskatchewan	10.5% on the first $45,225 of taxable income, ..
8	Alberta	10% on the first $131,220 of taxable income, +..
9	British Columbia	5.06% on the first $41,725 of taxable income, ..
10	Yukon	6.4% on the first $48,535 of taxable income, +..
11	Northwest Territories	5.9% on the first $43,957 of taxable income, +..
12	Nunavut	4% on the first $46,277 of taxable income, +\n..

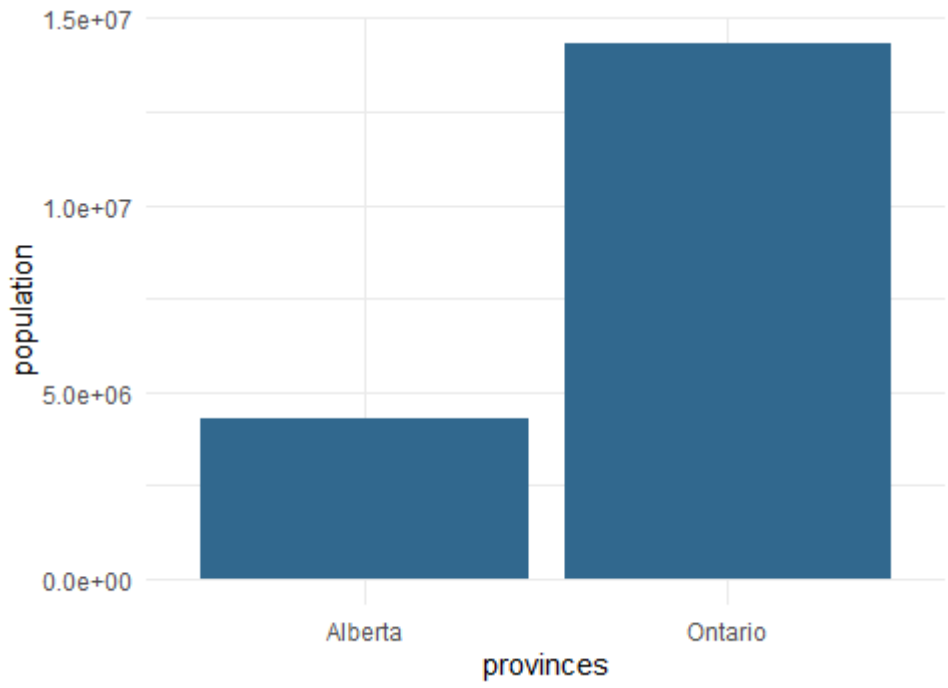
From the information extracted from Canada.ca, Ontario tops the list with the cheapest rate. They are the province with the most companies in Canada, strong manufacturing, finance and IT base. The internal generated revenue earned by Ontario is also the most in Canada with Toronto at the helm of affairs.

This good business climate in both Alberta and Ontario has fostered growth in immigrants and ultimately growth in population. See figures below.

	provinces	gdp	national_gdp_contribution	population_2018	gdp_per_capital	market_income_percapital
0	Canada	2,223,856	100	37,057,765	60,011	33,029
1	British Columbia	295,401	13.28	5,001,170	59,066	34,426
2	Alberta	344,812	15.51	4,300,721	80,175	39,056
3	Saskatchewan	80,679	3.63	1,162,978	69,373	31,724
4	Manitoba	72,688	3.27	1,353,403	53,708	28,853
5	Ontario	857,384	38.55	14,318,545	59,879	34,033
6	Quebec	439,375	19.76	8,387,632	52,384	29,689
7	New Brunswick	36,966	1.66	770,921	47,950	26,992
8	Prince Edward Island	6,994	0.31	153,584	45,539	27,043
9	Nova Scotia	44,354	1.99	959,500	46,226	28,672
10	Newfoundland and Labrador	33,241	1.49	525,604	63,243	29,646
11	Yukon	3,046	0.14	40,612	75,002	39,708
12	Northwest Territories	4,730	0.21	44,956	105,214	41,324
13	Nunavut	3,421	0.15	38,139	89,698	26,174

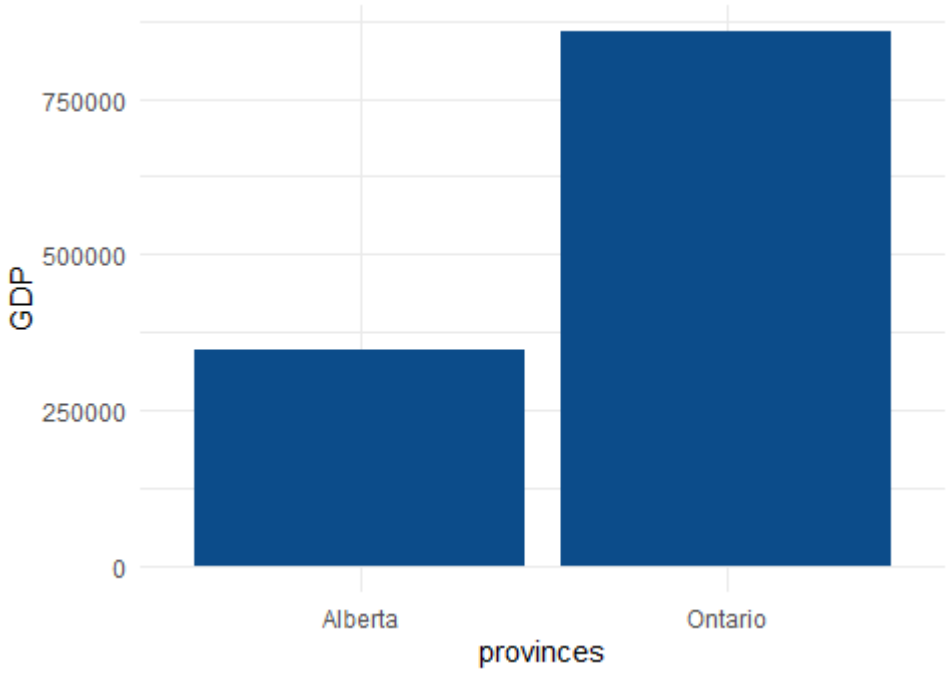
Excluding the French speaking region(Quebec), Alberta and Ontario have the most population with Ontario more than doubling that of Alberta. We are going to extract the provinces of choice and review via plots. See below

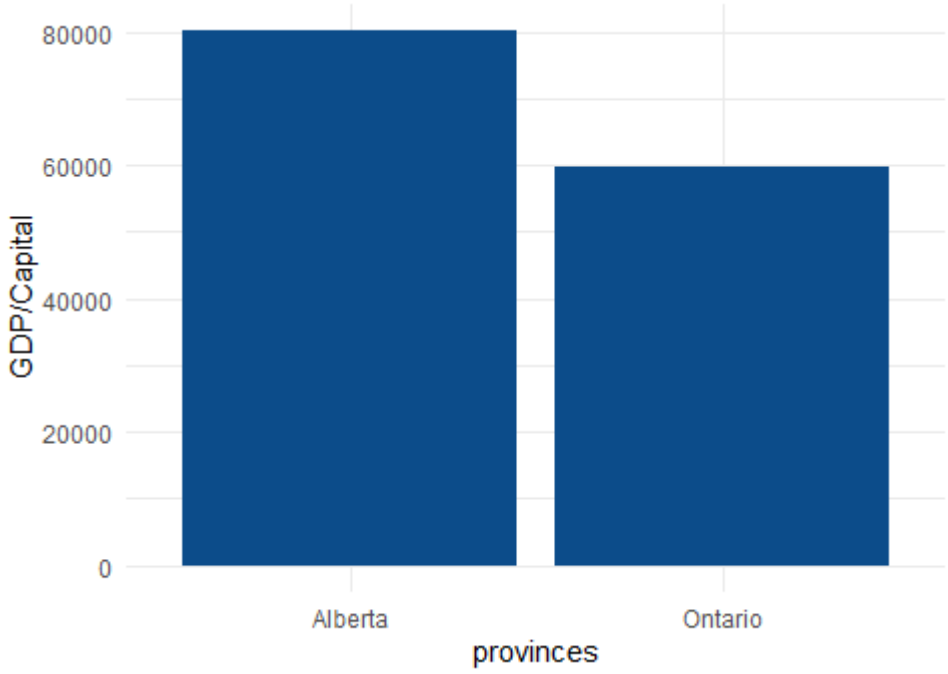
A



The difference in population is due to the face paced economic environment in Ontario. Toronta, the major city in Ontario is the most commercial city in Canada and several other neighbouring cities benefit from this vale chain. With thousands of prospective client requiring courier services, the market in Ontario seems big however, there are also many established competition.

Below are plots for GDP and GDP/capital.





Conclusion

In summary, it would seem that Ontario is the best destination for a courier company to commence operations, due to the size of the market there, favourable tax , and best in class GDP.A lot more review is required to determine the strength and weaknesses of our client and check that they would be better suited for either Ontario or Alberta.

CODES

```
# importing necessary libraries
from bs4 import BeautifulSoup
import requests
import numpy as np
import pandas as pd
from geopy.geocoders import Nominatim
##import folium
import json
from pandas.io.json import json_normalize # tranform JSON file into a pandas dataframe
from sklearn.cluster import KMeans
import matplotlib.cm as cm
import matplotlib.colors as colors
pd.set_option('display.max_columns', None)
pd.set_option('display.max_rows', None)
pd.set_option('display.width',1000)
%matplotlib inline

import matplotlib as mpl
import matplotlib.pyplot as plt

mpl.style.use('ggplot') # optional: for ggplot-like style


print('Libraries imported.')
```

```
#TAX
url='https://www.canada.ca/en/revenue-agency/services/tax/individuals/frequently-asked-questions-individuals/canadian-income-tax-rates-individuals-current-previous-years.html'
result=requests.get(url)
soup=BeautifulSoup(result.content,'html.parser')
table=soup.find('table')
trs=table.find_all('tr')
rows=[]

for tr in trs:
   i = tr.find_all('td')
   if i:
      rows.append(i)

taxtable = []
for row in rows:
   provinces = row[0].text.rstrip()
   taxrates = row[1].text.rstrip()
   taxtable.append([provinces,taxrates])

taxtable

cols = ['provinces','taxratesCode',]
df_tax = pd.DataFrame(taxtable, columns=cols)
print(df_tax.shape)

from bs4 import BeautifulSoup
import requests
import numpy as np
import pandas as pd
from geopy.geocoders import Nominatim
```

```
##import folium
import json
from pandas.io.json import json_normalize # tranform JSON file into a pandas dataframe
from sklearn.cluster import KMeans
import matplotlib.cm as cm
import matplotlib.colors as colors
pd.set_option('display.max_columns', None)
pd.set_option('display.max_rows', None)
pd.set_option('display.width',1000)

print('Libraries imported.')

url = 'https://www.canada.ca/en/revenue-agency/services/tax/individuals/frequently-asked-questions-individuals/canadian-income-tax-rates-individuals-current-previous-years.html'
result = requests.get(url)
soup = BeautifulSoup(result.content, 'html.parser')
table = soup.find('table')
trs = table.find_all('tr')
rows = []

for tr in trs:
    i = tr.find_all('td')
    if i:
        rows.append(i)

taxtable = []
for row in rows:
    provinces = row[0].text.rstrip()
    taxrates = row[1].text.rstrip()
    taxtable.append([provinces, taxrates])
```

cols = ['provinces','taxratesCode',]

df_tax = pd.DataFrame(taxtable, columns=cols)

df_tax.loc[df_tax['provinces'].isin(['Ontario','Alberta'])]

##GDP TABLE

```
url2 =
'https://en.m.wikipedia.org/wiki/List_of_Canadian_provinces_and_territories_by_gross_domestic_product'

result2 = requests.get(url2)

soup2 = BeautifulSoup(result2.text, 'html.parser')

table2 = soup2.find('table',{'class':"wikitable sortable"}).tbody

trs2 = table2.find_all('tr')

rows = []


for tr in trs2:
    i = tr.find_all('td')
    if i:
        rows.append(i)




gdptable = []




for row2 in rows:
    provinces=row2[0].text.strip()
    gdp = row2[1].text.rstrip()
    national_gdp_contribution = row2[2].text.rstrip()
```

```
    population_2018 = row2[3].text.rstrip()
    gdp_per_capital = row2[4].text.rstrip()
    market_income_percapital = row2[5].text.rstrip()

gdptable.append([provinces,gdp,national_gdp_contribution,population_2018,gdp_per_capital,market_income_percapital])

cols1 = ['provinces','gdp','national_gdp_contribution','population_2018','gdp_per_capital','market_income_percapital']

df_gdp = pd.DataFrame(gdptable, columns=cols1)

df_gdp

df_gdp[['provinces','gdp']]
```