

# SITE LOCATION RECOMMENDATION



2019-9-22

## Coursera Capstone Project Report

The project is used to help Company ABC determine the location for their first branch in Canada

Christy Chen

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# 1. INTRODUCTION

## 1.1 Background

Company ABC (the "Company") is a China-based Express Delivery Company who started their business about 5 years ago. With the rapid expanding trade between Canada and China, they foresee the potential profitability to open an international branch in Canada. Currently the Express Delivery Market is mainly lead by big corporate (e.g. FedEx, Canada Post, etc.). Considering the high shipping cost for individual or small business orders, the company built a strategy to only focus on China – Canada delivery and provide a friendlier rate to attract customer with small orders from the market. The company plans to open the first business in Ontario, and then depends on how the P&Ls within next 5 years. The main reason they choose Ontario as for it's being Canada's leading manufacturing province, and also tourism contributes heavily to the economy.

## 1.2 Business Problem

Currently, the Company had determined to open a new international Express Delivery branch in GTA, Ontario, with main focus on providing products & services to both individual and small business owners, and also thinking offering door-to-door service that will attract customers that would require more assistance. The Company now has two places in mind: Markham or Mississauga. They need to determine which City and where they should open the branch that will allow them to attract more business. The ideal site location should take the following requirement into consideration (if not all, as much as possible):

- a. Enough space for truck loading / offloading
- b. Inventory place which is secured and good for temperature-sensitive product
- c. Easily accessible to transportation options (e.g. near highway)
- d. Ideal no or minimum competing business nearby
- e. Parking space and public-transit friendly
- f. Noticeable store front for advertisement
- g. Cost of the rent

## 1.3 Interest Audience

The use of FourSquare API and analysis combined with data analysis will help resolve the key questions arisen. The final result will be presented to the key stakeholders in the company to help them determine whether they will proceed opening a new branch in the recommended area. Further adjustment could lead to next round of deeper analysis based on the feedback received from the board.

## 2. DATA PREPARATION

### 2.1 CENSUS data (2016) for Markham & Mississauga

A national census in Canada is conducted every five years by Statistics Canada, which provides demographic and statistical data to plan public services including health care, education, and transportation, determine federal transfer payments. Two csv files has been created for Markham and Mississauga 2016 CENSUS result, which will be read in order to create a data frame. The csv file “CENSUS\_Markham.csv”<sup>[1]</sup> (*figure 1*) and “CENSUS\_Mississauga.csv”<sup>[2]</sup> (*figure 2*) has the following below data structure. The file will be directly read to the Jupiter Notebook for convenience and space savings.

|   | Category            | Sub_Category   | Total | Male    | Female  |
|---|---------------------|----------------|-------|---------|---------|
| 0 | Age characteristics | 0 to 4 years   | 17085 | 8715.0  | 8370.0  |
| 1 | Age characteristics | 5 to 9 years   | 19085 | 9905.0  | 9180.0  |
| 2 | Age characteristics | 10 to 14 years | 19220 | 9950.0  | 9270.0  |
| 3 | Age characteristics | 15 to 19 years | 21095 | 10910.0 | 10185.0 |
| 4 | Age characteristics | 20 to 24 years | 21455 | 11225.0 | 10230.0 |

Figure 1: Data frame created from 2016 Markham CENSUS data

|   | Category            | Sub_Category   | Total | Male    | Female  |
|---|---------------------|----------------|-------|---------|---------|
| 0 | Age characteristics | 0 to 4 years   | 35460 | 17880.0 | 17585.0 |
| 1 | Age characteristics | 5 to 9 years   | 41485 | 21220.0 | 20270.0 |
| 2 | Age characteristics | 10 to 14 years | 43980 | 22805.0 | 21180.0 |
| 3 | Age characteristics | 15 to 19 years | 49205 | 25670.0 | 23535.0 |
| 4 | Age characteristics | 20 to 24 years | 53645 | 27795.0 | 25850.0 |

Figure 2: Data frame created from 2016 Mississauga CENSUS data

## 2.2 Crime data for Markham & Mississauga

In this report, I will use 2017 data to compare between Markham and Mississauga due to the data accessibility limitation. Two csv files has been created which will be read in order to create a data frame. The csv file “Crime Markham.csv”<sup>[3]</sup> (figure 3) and “Crime\_Mississauga.csv”<sup>[4]</sup> (figure 4) has the following below data structure. The file will be directly read to the Jupiter Notebook for convenience and space savings.

|   | Category                           | 2017Actual | 2017Percent Cleared | 2017Rate Per 100,000 Population | 2018Actual | 2018Percent Cleared | 2018Rate Per 100,000 Population |
|---|------------------------------------|------------|---------------------|---------------------------------|------------|---------------------|---------------------------------|
| 0 | Crimes Against Persons             | 1,598      | 76.4                | 447.97                          | 1,831      | 72.6                | 525.07                          |
| 1 | Violations Causing Death           | 1          | 200.0               | 0.28                            | 2          | 50.0                | 0.57                            |
| 2 | Attempt Capital Crime              | 4          | 75.0                | 1.12                            | 3          | 100.0               | 0.86                            |
| 3 | Sexual Violations                  | 136        | 68.4                | 38.13                           | 155        | 68.4                | 44.45                           |
| 4 | Commodification of Sexual Activity | 33         | 90.9                | 9.25                            | 15         | 86.7                | 4.30                            |

Figure 3: Data frame created from Markham Crime data

|   | Category               | 2016Number | 2016Percent Solved | 2016Rate per 100,000 | 2017Number | 2017Percent Solved | 2017Rate per 100,000 |
|---|------------------------|------------|--------------------|----------------------|------------|--------------------|----------------------|
| 0 | Crimes Against Persons | 3524       | 0.759              | 466.1                | 3876       | 0.727              | 511.3                |
| 1 | Homicide               | 6          | 0.500              | 0.8                  | 9          | 1.000              | 1.2                  |
| 2 | Attempt Murder         | 15         | 0.467              | 2.0                  | 9          | 0.667              | 1.2                  |
| 3 | Robbery - Total        | 423        | 0.414              | 56.0                 | 480        | 0.381              | 63.3                 |
| 4 | Robbery - With Weapons | 246        | 0.407              | 32.5                 | 261        | 0.356              | 34.4                 |

Figure 4: Data frame created from Mississauga data

## 2.3 Geographical Information for Markham & Mississauga

Import the library to handle the request as well as the module to convert an address into latitude and longitude values. Result see below table:

Table 1: Geographical information for Markham & Mississauga

| City        | Latitude  | Longitude  |
|-------------|-----------|------------|
| Markham     | 43.854336 | -79.326782 |
| Mississauga | 43.590338 | -79.645729 |

## 2.4 Neighbourhood Information for both Markham & Mississauga

The csv file “Postalcode\_Markham.csv”<sup>[5]</sup> (figure 5) and “Postalcode\_Mississauga.csv”<sup>[6]</sup> (figure 6) has the following below data structure. The file will be directly read to the Jupiter Notebook for convenience and space savings.

|   | Postalcode | Borough | Neighbourhood                                     |
|---|------------|---------|---|
| 0 | L6C        | Markham | Berczy Village, Cachet, Angus Glen, Cathedralt... |
| 1 | L3S        | Markham | Markham Southeast, Armadale, Legacy, Rouge Fai... |
| 2 | L3R        | Markham | Outer Southwest, Crosby, Milliken Mills, Brown... |
| 3 | L3P        | Markham | Central, Markham Village, Mount Joy, Bullock, ... |
| 4 | L6G        | Markham | Downtown Markham, Markham Centre                  |

Figure 5: Data frame created from Markham Neighbourhood data

|   | Postalcode | Borough | Neighbourhood                                     |
|---|------------|---------|---|
| 0 | L6C        | Markham | Berczy Village, Cachet, Angus Glen, Cathedralt... |
| 1 | L3S        | Markham | Markham Southeast, Armadale, Legacy, Rouge Fai... |
| 2 | L3R        | Markham | Outer Southwest, Crosby, Milliken Mills, Brown... |
| 3 | L3P        | Markham | Central, Markham Village, Mount Joy, Bullock, ... |
| 4 | L6G        | Markham | Downtown Markham, Markham Centre                  |

Figure 6: Data frame created from Mississauga Neighbourhood data

## 2.5 How the data will be used to solve the problem

The data will be used as follow: First, compare the demographical data (using 2016 CENSUS data for Markham and Mississauga) as well as the Crime data, provide analysis and determine which city would be the recommended city to choose to open the new branch. Then based on the city selected, using foursquare and geopy data to explore the venue among neighbors. Finally based on the result from last step, recommend the area the company to rent and as the new site location.

## 3. METHODOLOGY

### 3.1 Age Group

Started with exploring the CENSUS data for both Markham and Mississauga. With the pre-generated data frame (as shown in figure 1 and figure 2), a separated data frame (*figure 7*) was created which included the comparison of resident between two cities. The first analysis was done based on the total number of resident and was plotted into a bar graph. The height of the bar represent the percentage of each age group within the total number of resident.

Let's focus on the age group 25 – 40 now. The reason why I select this age range because people within this ranges seems have stronger shopping power and less time due to the busy working schedule. From the bar chart (*figure 8*) we can see that Mississauga (in color blue) has a higher % compare to the Markham (in color red). Also, Also considering there are major differences between female and male in shopping habit and buying decisions and female tend to do shopping more often than male, and they usually take care of the grocery. If we use the same data frame but only look at the female part for a moment (*figure 9*) and we can also tell from the chart that Mississauga has a higher % compare to the Markham. Mississauga has a slightly higher percentage than Markham, but not major difference.

|                    | Markham_Total | Mississauga_Total |
|--------------------|---------------|-------------------|
| Age Group          |               |                   |
| 0 to 4 years       | 17085         | 35460             |
| 5 to 9 years       | 19085         | 41485             |
| 10 to 14 years     | 19220         | 43980             |
| 15 to 19 years     | 21095         | 49205             |
| 20 to 24 years     | 21455         | 53645             |
| 25 to 29 years     | 21170         | 47170             |
| 30 to 34 years     | 20385         | 44695             |
| 35 to 39 years     | 20345         | 45050             |
| 40 to 44 years     | 23535         | 48505             |
| 45 to 49 years     | 24880         | 54770             |
| 50 to 54 years     | 25980         | 59925             |
| 55 to 59 years     | 23510         | 53435             |
| 60 to 64 years     | 21325         | 42485             |
| 65 to 69 years     | 18215         | 34385             |
| 70 to 74 years     | 11865         | 24400             |
| 75 to 79 years     | 8645          | 18130             |
| 80 to 84 years     | 5885          | 12775             |
| 85 to 89 years     | 3395          | 7780              |
| 90 to 94 years     | 1475          | 3395              |
| 95 to 99 years     | 390           | 805               |
| 100 years and over | 60            | 120               |

Figure 7: Data frame created for total resident in both Markham and Mississauga

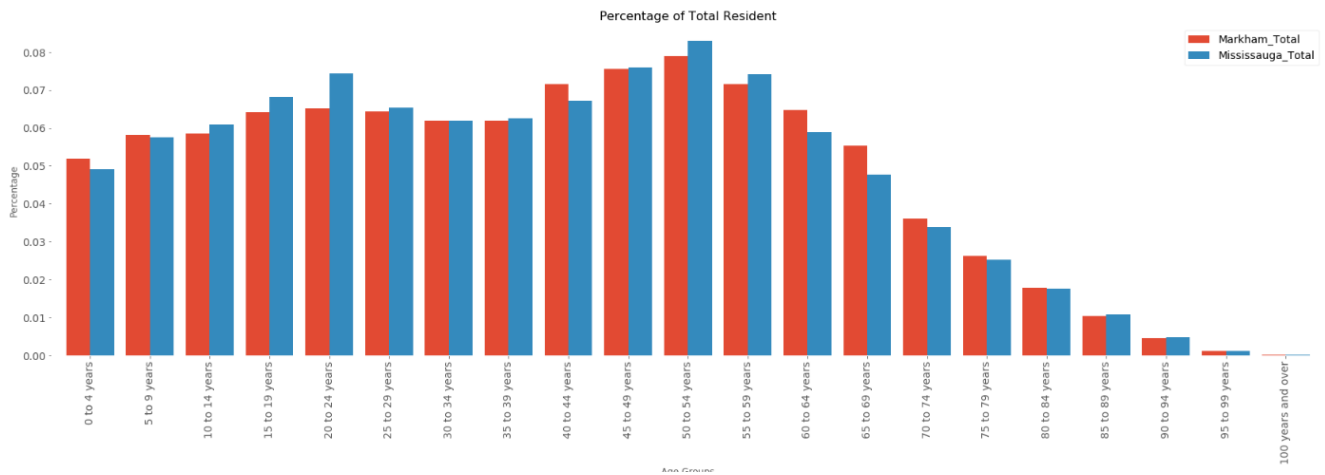


Figure 8: Percentage of different age groups in total resident in both Markham and Mississauga

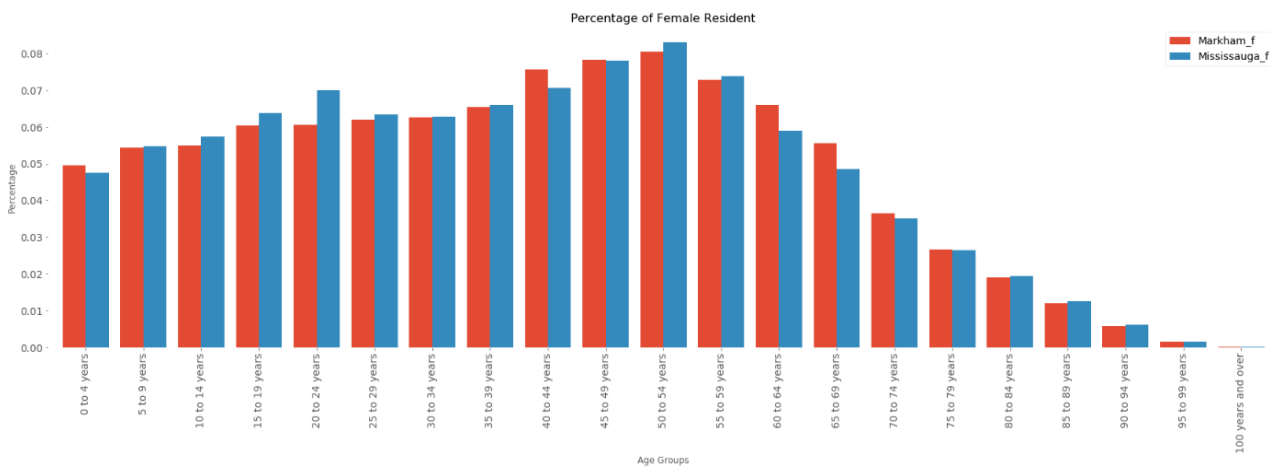


Figure 9: Percentage of different age groups in female resident in both Markham and Mississauga

### 3.2 Crime Rate

Secondly, with exploring the crime rate data for both Markham and Mississauga. Due to the data limitation that I was only able to get 2017 as the most common year which has the crime data for both cities, the 2017 result will be used as a foundation for the analysis. With the pre-generated data frame (as shown in figure 3 and figure 4), a separated data frame (*figure 10*) was created which only retrieves 5 main categories (including “Crime Against Persons”, Crimes Against Property”, etc.) to show comparison between two cities. The first analysis was done based on the total count of crimes happened and was plotted into a bar graph. The height of the bar represents the count of crimes within the 5 main categories.

From the bar chart (*figure 11*) we can tell that Mississauga has a higher count of the crime happened in 2017 than Markham, in all of the crime category. However, consider the population difference between the two cities, another chart (*figure 12*) was plotted based on the % among total resident in two cities. From the chart we can see Mississauga has a higher



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percentage of crime rate among the total population, and the "Crimes Against Property" which is more related to the safety to a building / inventory has the most difference. So Markham will consider as a better choice when talks to safety concern.

| Mississauga Markham          |       |      |
|------------------------------|-------|------|
| Category                     |       |      |
| Crimes Against Persons       | 3876  | 1598 |
| Crimes Against Property      | 14135 | 4814 |
| Other Criminal Code Offences | 2233  | 595  |
| Drugs                        | 1201  | 574  |
| Traffic Offences             | 2778  | 1077 |

Figure 10: Count of Different Crime occurrence in both Markham and Mississauga for 2017

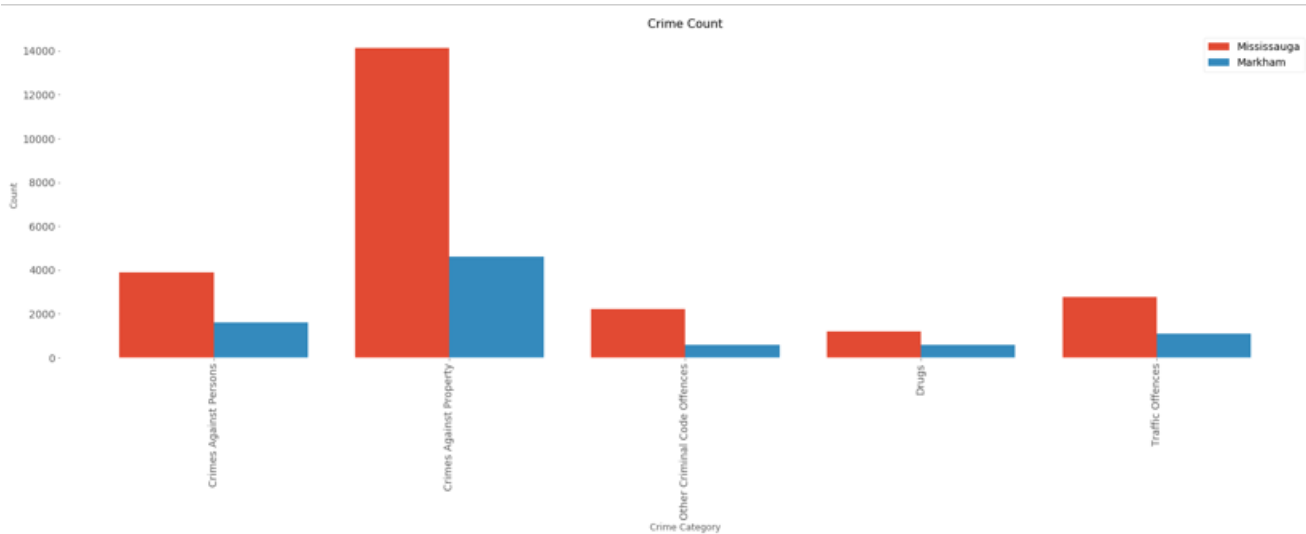


Figure11: Count of Different Crime occurrence in both Markham and Mississauga for 2017

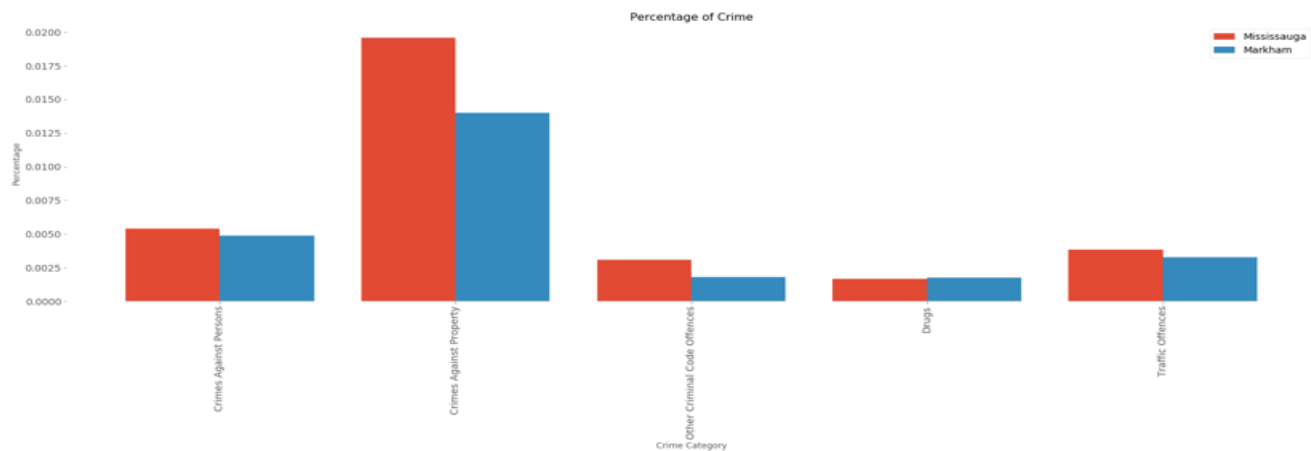


Figure 12: Percentage of different Crime occurrence in both Markham and Mississauga for 2017

### 3.3 Visible Minority Population

Again we use the CENSUS data for both Markham and Mississauga. With the pre-generated data frame (as shown in figure 1 and figure 2), a separated data frame (*figure 13*) was created which included the comparison of visible minority population between two cities. After exploring the visible minority population data in both Markham and Mississauga (*figure 14*), we can see that Markham has much higher Chinese population than Mississauga. Thinking that the company is a China-based Express Delivery company and want to mainly focus on Canada – China international business, Markham seems a better city to choose.

|                                    | Markham_Total | Mississauga_Total |
|------------------------------------|---------------|-------------------|
| <b>Visible minority population</b> |               |                   |
| South Asian                        | 58270         | 165765            |
| Chinese                            | 147725        | 54090             |
| Black                              | 9855          | 47005             |
| Filipino                           | 8905          | 38570             |
| Latin American                     | 1750          | 16110             |
| Arab                               | 3250          | 36200             |
| Southeast Asian                    | 2520          | 14795             |
| West Asian                         | 7910          | 7910              |
| Korean                             | 4355          | 6095              |
| Japanese                           | 995           | 1965              |
| Visible minority; n.i.e.           | 2920          | 9050              |
| Multiple visible minorities        | 6895          | 13370             |

Figure 13: Count of visible minority population in both Markham and Mississauga



Figure 14: Count of visible minority population in both Markham and Mississauga

### 3.4 Household income

Again we use the CENSUS data for both Markham and Mississauga. With the pre-generated data frame (as shown in figure 1 and figure 2), a separated data frame (*figure 15*) was created which included the comparison of visible minority population between two cities. If we take a look into the general household income for 2015 (*figure 16*), we can see Markham has a higher population distribution % among the "<10k" and ">100k" group, while Mississauga has a higher population distribution % between "10k - 100k".

|                    | Markham_Total | Mississauga_Total |
|--------------------|---------------|-------------------|
| Income Group       |               |                   |
| Under \$5,000      | 2280          | 4765              |
| 5,000to9,999       | 1295          | 2665              |
| 10,000to14,999     | 1780          | 4320              |
| 15,000to19,999     | 2615          | 6755              |
| 20,000to24,999     | 2805          | 7805              |
| 25,000to29,999     | 3660          | 8340              |
| 30,000to34,999     | 3820          | 9050              |
| 35,000to39,999     | 3850          | 9975              |
| 40,000to44,999     | 4010          | 10700             |
| 45,000to49,999     | 3850          | 10800             |
| 50,000to59,999     | 7830          | 20795             |
| 60,000to69,999     | 7400          | 19370             |
| 70,000to79,999     | 7295          | 18445             |
| 80,000to89,999     | 6755          | 16565             |
| 90,000to99,999     | 6220          | 14630             |
| 100,000to124,999   | 12615         | 28485             |
| 125,000to149,999   | 9070          | 18660             |
| \$150,000 and over | 15535         | 28770             |

Figure 15: Household income count for 2015 distribution for both Markham and Mississauga

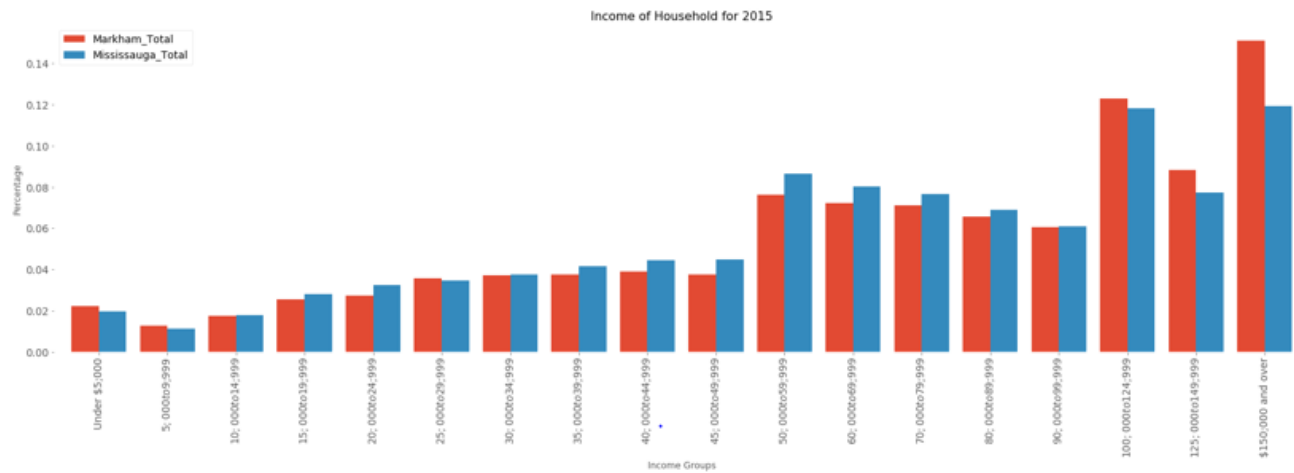


Figure 16: Household income for 2015 distribution for both Markham and Mississauga

### 3.5 Competitor

Started with city Markham by creating a map (figure 17) and plotted the neighbourhood on the map. Using Foursquare API to explore the venues within Markham, but only focus on the competitors (figure 18; the method I took is to add the categoryid in the URL when I connect the API). Then repeat the same steps but for city Mississauga (figure 19 and figure 20). By reading the venue list for both cities, we can see they both have the common "big" brand post office like "Canada Post", "Fedex", "UPS", etc. distributed in neighbourhoods. So from a "No or less competitor" perspective, two cities are similar to each other. It will depends on how the company end up determining which certain location they will open the branch to have a further analysis.

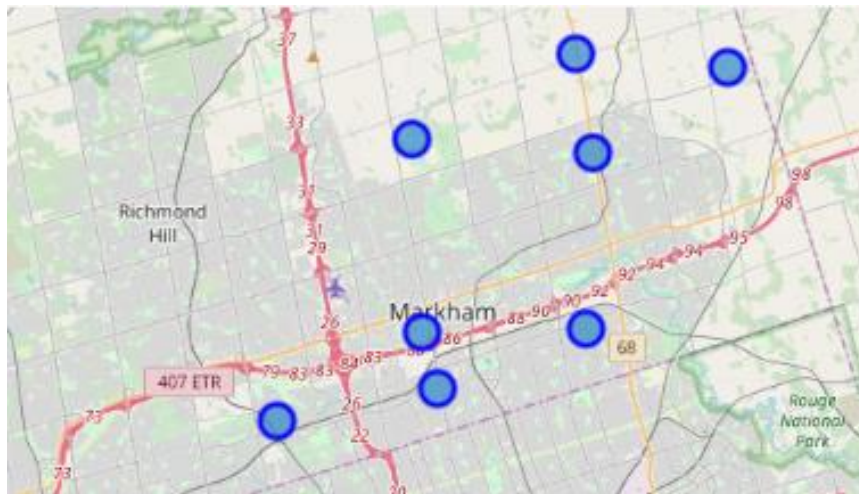


Figure 16: Markham Map

|    | Neighbourhood                                     | Neighbourhood Latitude | Neighbourhood Longitude | Venue                             | Venue Latitude | Venue Longitude | Venue Category |
|----|---|------------------------|-------------------------|-----------------------------------|----------------|-----------------|----------------|
| 0  | Bercy Village, Caledon, Angus Glen, Cathlamet...  | 43.904525              | -79.335038              | Canada Post                       | 43.895945      | -79.370189      | Post Office    |
| 1  | Bercy Village, Caledon, Angus Glen, Cathlamet...  | 43.904525              | -79.335038              | Canada Post                       | 43.894090      | -79.291939      | Post Office    |
| 2  | Bercy Village, Caledon, Angus Glen, Cathlamet...  | 43.904525              | -79.335038              | Canada Post                       | 43.895254      | -79.381542      | Post Office    |
| 3  | Markham Southeast, Amosble, Legacy, Rouge Fal...  | 43.846295              | -79.289179              | FedEx                             | 43.829030      | -79.298999      | Post Office    |
| 4  | Markham Southeast, Amosble, Legacy, Rouge Fal...  | 43.846295              | -79.289179              | The UPS Store                     | 43.871893      | -79.289991      | Post Office    |
| 5  | Markham Southeast, Amosble, Legacy, Rouge Fal...  | 43.846295              | -79.289179              | Milliken Wells Post Office        | 43.825335      | -79.277483      | Post Office    |
| 6  | Markham Southeast, Amosble, Legacy, Rouge Fal...  | 43.846295              | -79.289179              | Canada Post                       | 43.833413      | -79.306280      | Post Office    |
| 7  | Markham Southeast, Amosble, Legacy, Rouge Fal...  | 43.846295              | -79.289179              | Post Office at Recall Pharma Plus | 43.887469      | -79.229599      | Post Office    |
| 8  | Markham Southeast, Amosble, Legacy, Rouge Fal...  | 43.846295              | -79.289179              | Loomis Express / DHL              | 43.835794      | -79.315711      | Post Office    |
| 9  | Markham Southeast, Amosble, Legacy, Rouge Fal...  | 43.846295              | -79.289179              | Canada Post                       | 43.840047      | -79.322525      | Post Office    |
| 10 | Markham Southeast, Amosble, Legacy, Rouge Fal...  | 43.846295              | -79.289179              | Recall                            | 43.887280      | -79.229116      | Pharmacy       |
| 11 | Outer Southwest, Crosby, Milliken Mills, Brown... | 43.831990              | -79.328545              | Canada Post                       | 43.840047      | -79.322525      | Post Office    |

Figure 17: Markham venue information



Figure 18 Mississauga Map

|    | Neighbourhood                                       | Neighbourhood Latitude | Neighbourhood Longitude | Venue              | Venue Latitude | Venue Longitude | Venue Category |
|----|---|------------------------|-------------------------|--------------------|----------------|-----------------|----------------|
| 0  | Mississauga Valley, East Oakville                   | 43.589405              | -79.839485              | Canada Post        | 43.583388      | -79.844408      | Post Office    |
| 1  | Mississauga Valley, East Oakville                   | 43.589405              | -79.839485              | Canada Post        | 43.581112      | -79.848925      | Post Office    |
| 2  | Mississauga Valley, East Oakville                   | 43.589405              | -79.839485              | Fedex              | 43.634893      | -79.574148      | Post Office    |
| 3  | Mississauga Valley, East Oakville                   | 43.589405              | -79.839485              | Canada Post        | 43.589877      | -79.880621      | Post Office    |
| 4  | Mississauga Valley, East Oakville                   | 43.589405              | -79.839485              | Shoppers Drug Mart | 43.625522      | -79.834745      | Pharmacy       |
| 5  | West Oakville, Fairview, City Centre, East Oakville | 43.578945              | -79.832899              | Canada Post        | 43.581112      | -79.848925      | Post Office    |
| 6  | West Oakville, Fairview, City Centre, East Oakville | 43.578945              | -79.832899              | Canada Post        | 43.583388      | -79.844408      | Post Office    |
| 7  | West Oakville, Fairview, City Centre, East Oakville | 43.578945              | -79.832899              | Canada Post        | 43.589877      | -79.880621      | Post Office    |
| 8  | West Oakville, Fairview, City Centre, East Oakville | 43.578945              | -79.832899              | UPS Store #84      | 43.615335      | -79.881122      | Post Office    |
| 9  | West Oakville, Fairview, City Centre, East Oakville | 43.582332              | -79.851714              | Canada Post        | 43.581112      | -79.848925      | Post Office    |
| 10 | West Oakville, Fairview, City Centre, East Oakville | 43.582332              | -79.851714              | Canada Post        | 43.583388      | -79.844408      | Post Office    |
| 11 | West Oakville, Fairview, City Centre, East Oakville | 43.582332              | -79.851714              | Canada Post        | 43.582800      | -79.872800      | Post Office    |

Figure 19 Mississauga venue information

## 4. RESULT

### 4.1 Markham vs Mississauga

We can see from the Winner table (figure 20): First, when it comes to the total population reside in both Markham and Mississauga, Mississauga has a slightly higher percentage of population who is within 25-40 age (from both total count and only count female residents) than Markham. However, we can also tell from the bar chart that the difference is not material. Second, when we compare the crime rate (data as of 2017) between both Markham and Mississauga, we can see that Mississauga has a higher percentage of crime rate among the total population, So Markham will consider as a better choice when talks to safety concern.

Next, from a visible minority population perspective, as we already know the company is a China-based company and the main focus of their service / product will be Canada - China express delivery, it make more sense for them to place the new branch in the city which has the higher population of Chinese people, which in this case will be Markham. Furthermore, if we take a look into the general household income for 2015, we can see Markham has a higher population distribution % among the "<10k" and ">100k" group, while Mississauga has a higher population distribution % between "10k - 100k". Last but not least, both cities have the common "big" brand post office like "Canada Post", "Fedex", "UPS", etc. is accessible to the resident. So from a "No or less competitor" perspective, two cities are similar to each other.

In conclusion, Markham will be a better choice for the company to place the first branch

| "Winner"                    |             |
|-----------------------------|-------------|
| Methodology Category        |             |
| Age Group Distribution      | Mississauga |
| Crime Rate                  | Markham     |
| Visible Minority Population | Markham     |
| Household Income            | Markham     |
| Competitor Around           | Both        |

Figure 20 Winner table

### 4.2 Further Explore

As we can see Markham seems a better site location choice, let’s take a closer look into this city. We can see from the information that each neibourhood have tons of venues around, and from the Venue name we can tell lots of place are Chinese Restaurants or companies (*figure 21*). Since the company focus is on China – Canada shipping and their target customer is individual and small business owners, Markham is a better choice. And I also generated the top 10 venue (*figure 22*) for each neighbourhood for the reference to help the company determine a further detail location to open the company. A cluster map has also been generated to show neighbours with commonality.

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|   | Neighbourhood                                    | Neighbourhood Latitude | Neighbourhood Longitude | Venue  | Venue Latitude | Venue Longitude | Venue Category          |
|---|--|------------------------|-------------------------|--|----------------|-----------------|-------------------------|
| 0 | Bercozy Village, Cachet, Angus Glen, Cathedra... | 43.904525              | -79.339338              | Angus Glen Golf Club                             | 43.902117      | -79.324683      | Golf Course             |
| 1 | Bercozy Village, Cachet, Angus Glen, Cathedra... | 43.904525              | -79.339338              | Angus Glen Community Centre & Library            | 43.894548      | -79.335758      | Community Center        |
| 2 | Bercozy Village, Cachet, Angus Glen, Cathedra... | 43.904525              | -79.339338              | Toogood Pond                                     | 43.870701      | -79.313803      | Park                    |
| 3 | Bercozy Village, Cachet, Angus Glen, Cathedra... | 43.904525              | -79.339338              | Old Firehall Confectionary                       | 43.887126      | -79.312084      | Dessert Shop            |
| 4 | Bercozy Village, Cachet, Angus Glen, Cathedra... | 43.904525              | -79.339338              | Wonton Chai Noodle 喜茶行                           | 43.885312      | -79.372231      | Asian Restaurant        |
| 5 | Bercozy Village, Cachet, Angus Glen, Cathedra... | 43.904525              | -79.339338              | Main Street                                      | 43.887774      | -79.311948      | Road                    |
| 6 | Bercozy Village, Cachet, Angus Glen, Cathedra... | 43.904525              | -79.339338              | Cosmo Music - The Musical Instrument Superstore! | 43.890410      | -79.393270      | Music Store             |
| 7 | Bercozy Village, Cachet, Angus Glen, Cathedra... | 43.904525              | -79.339338              | Next Door  | 43.885531      | -79.310234      | New American Restaurant |
| 8 | Bercozy Village, Cachet, Angus Glen, Cathedra... | 43.904525              | -79.339338              | Old Country Inn                                  | 43.887994      | -79.312518      | German Restaurant       |

Figure 21 Markham neighbor venue information

| Postalcode | Borough | Neighbourhood | Latitude  | Longitude | Cluster Labels | 1st Most Common Venue | 2nd Most Common Venue | 3rd Most Common Venue | 4th Most Common Venue | 5th Most Common Venue | 6th Most Common Venue | 7th Most Common Venue | 8th Most Common Venue | 9th Most Common Venue | 10th Most Common Venue |                               |
|------------|---------|---------------|---|-----------|----------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|------------------------|-------------------------------|
| 0          | L6C     | Markham       | Bercozy Village, Cachet, Angus Glen, Cathedral... | 43.904525 | -79.339338     | 1                     | Coffee Shop           | Bank                  | Fast Food Restaurant  | Golf Course           | Pharmacy              | Pizza Place           | Sandwich Place        | Park                  | Other Great Outdoors   | Supermarket                   |
| 1          | L3S     | Markham       | Markham Southeast, Armadale, Legacy, Rouge Fai... | 43.849285 | -79.269179     | 0                     | Bakery                | Chinese Restaurant    | Bubble Tea Shop       | Asian Restaurant      | Italian Restaurant    | Supermarket           | Hakka Restaurant      | Noodle House          | Dessert Shop           | Vegetarian / Vegan Restaurant |
| 2          | L3R     | Markham       | Outer Southwest, Crosby, Milliken Mills, Brown... | 43.831980 | -79.328545     | 4                     | Bakery                | Chinese Restaurant    | Japanese Restaurant   | Dessert Shop          | Caribbean Restaurant  | Gym                   | Hotel                 | Tea Room              | Bubble Tea Shop        | Noodle House                  |
| 3          | L3P     | Markham       | Central, Markham Village, Mount Joy, Bullock, ... | 43.929105 | -79.273375     | 3                     | Coffee Shop           | Sandwich Place        | Pizza Place           | Fast Food Restaurant  | Bank                  | Sushi Restaurant      | Pharmacy              | Beer Store            | Café                   | Breakfast Spot                |
| 4          | L4G     | Markham       | Downtown Markham, Markham                         | 43.848375 | -79.334748     | 3                     | Bakery                | Chinese               | Hotel                 | Dessert Shop          | Japanese              | Bubble Tea            | Noodle House          | BBQ Joint             | Gym / Fitness          | Cantonese                     |

Figure 22 Markham top 10 venues within each neighbourhood

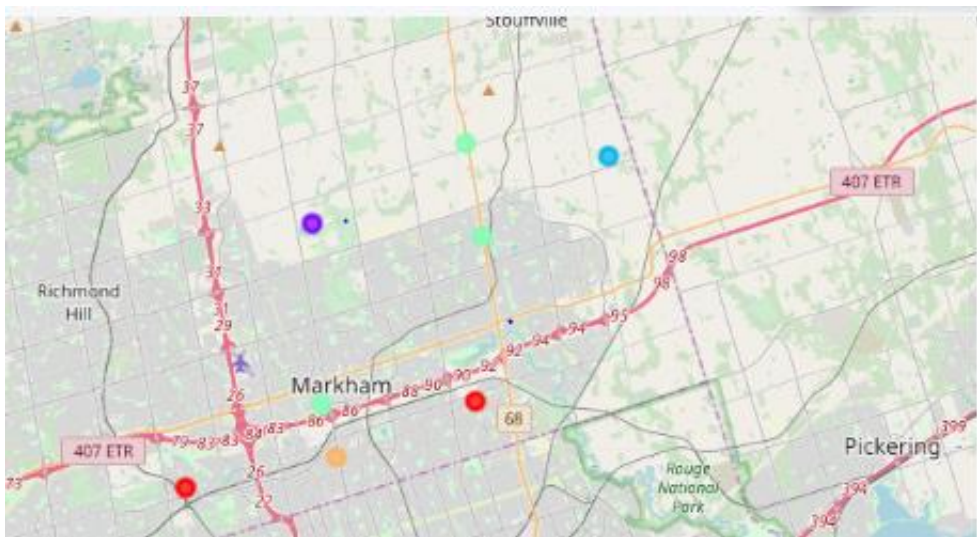


Figure 22 Clustered neighbourhood map in Markham



## 5. DISCUSSION

Based on the analysis above, I will recommend the company to open their first international branch in Markham, considering it's safer neighbour environment and larger Chinese resident population. We can also see from the map that Markham has an Airport and also it's has pretty advance public transportation network through the city. Also, always consider that the company mainly focuses on China - Canada international shipping so the Chinese population size plays a key part in the decision fact.

## 6. CONCLUSION

In this report, I explored multiple data for both Markham and Mississauga first. And then identified from a population, crime information, geographical exploration perspective etc. and then based on the analysis result, provided the recommendation that Markham will be a better choice over Mississauga to be the location for the first international site. Those component can also be part of the consideration when company decide to open another branches in the future, or identifying their marketing strategy. Of course there are more component the company need to think of before they actually determine which location they will pick, but with the base of the analysis in this report it should provide them a good solid starting point to continue the conversation.