ANALYSIS OF BICYCLES STOLEN IN TORONTO AREA FOR THE YEARS BETWEEN 2014 - 2019

October 2020

INTRODUCTION

Data Analysis is a process of inspecting, cleansing, transforming and modelling data with the goal of discovering useful information in order to draw conclusion and support decision making.

Under this brief definition, we will use different statistical tools that will help us to identify some important facts in order to figure out Reasons or Patterns that creates actionable insights about what happened and what is likely to occur in the future.

SUMMARY

Bicycles are today an important means of transportation for thousand of people because of all the benefits that are include on it, like:

- keeping in good health shape,
- Very convinient for short travels ,
- Good way of saving money and time,
- many people ride only for fun.

One of the big inconvinients is that bicycles are very easy to be stolen. The present analysis will help us to have an overview of this problem in Toronto area.

OBJECTIVES

- Determine the Neighbourhoods with more incidences in bicycles stolen.
- Discover what model or bicycle brands are the most stolen.
- Analyze under which season of the year the stolen bicycles occure more.
- Evaluate the recovery efficiency of stolen bicycles.
- Figure out what will be the annualize cost of stolen bicycles.

METHODOLOGY

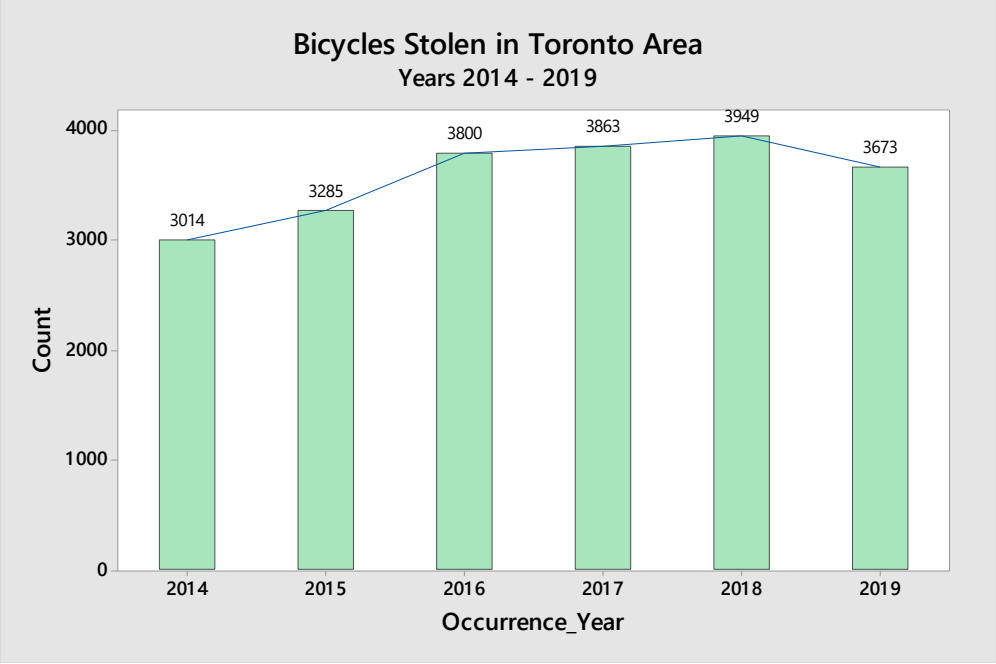
For the present analysis we are going to use a secondary data that was extrapolated from Toronto Open Data website update until 2019. In order to reach the objectives of this analysis, we will apply Descriptive Statistics to draw conclusions based on the historical data .

We are going to separate the Analysis section in Six mean areas for a better uderstanding of the Data.

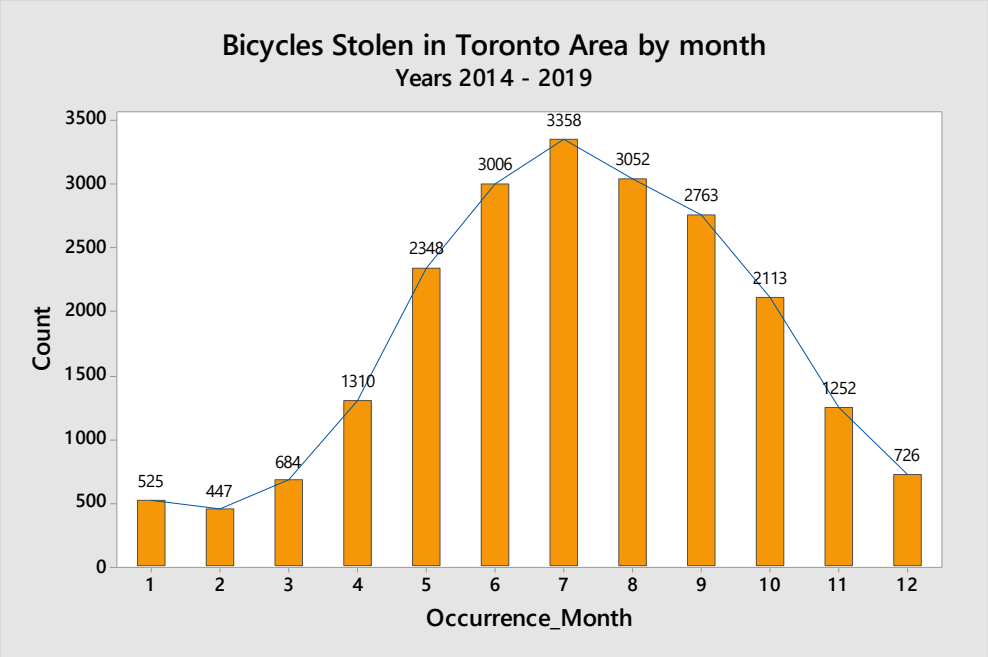
1) Calendar (Including the date and time when the bicycle was stolen).
2) Bicycle Make (Type of bicycles preferred to be Stolen)
3) Place (The Location from where the bicycle was stolen).
4) Neighbourhood (What neighbourhoods have the most Cases)
5) Cost of bicycle
6) Recovery productivity

ANALYSIS

1) Calendar



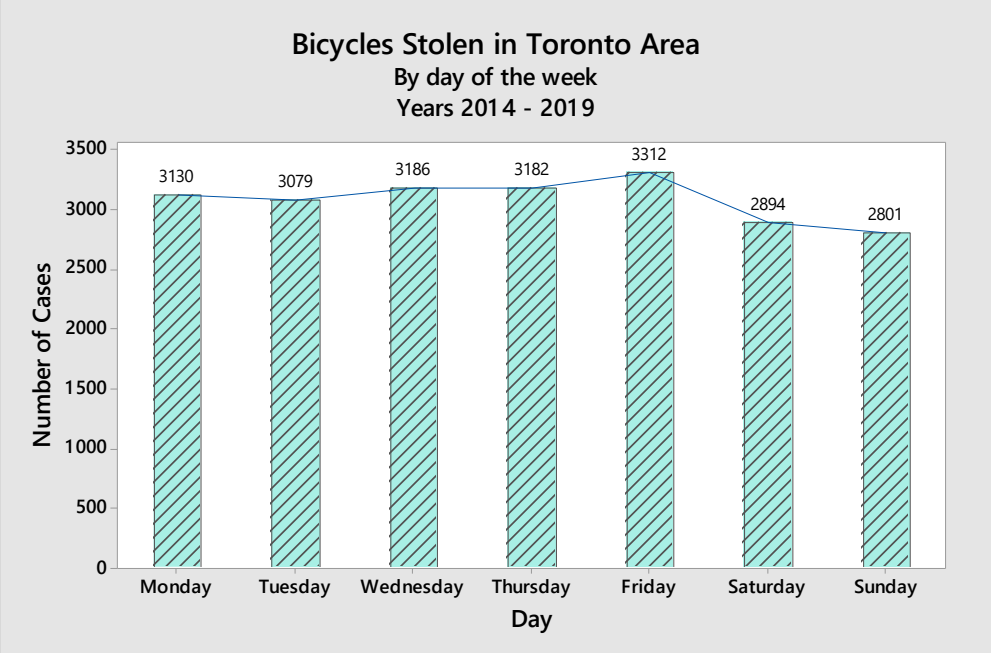
On this graph we can appreciate a growing pattern since 2014 to 2018 in a rate of 7.2% and a light decline in 2019 of 7.0%. The average by year will be 3598 bicycles stolen , and by day would be 10 bicycles.



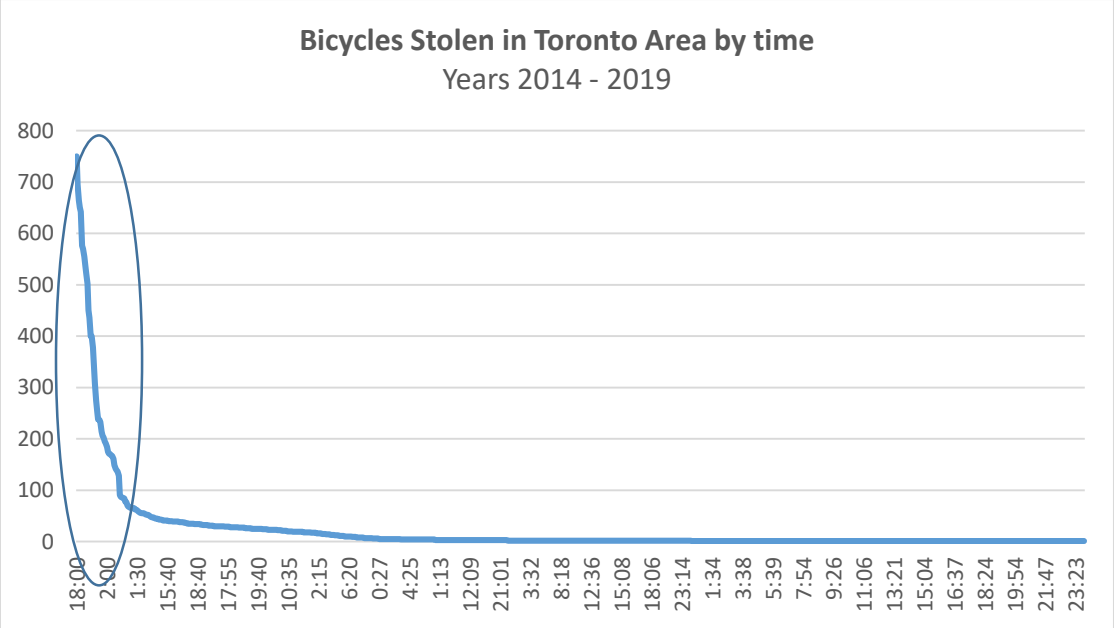
The Months with more incidence in bicycles stolen are:

May, June, July, August, September, October

With a peak in July

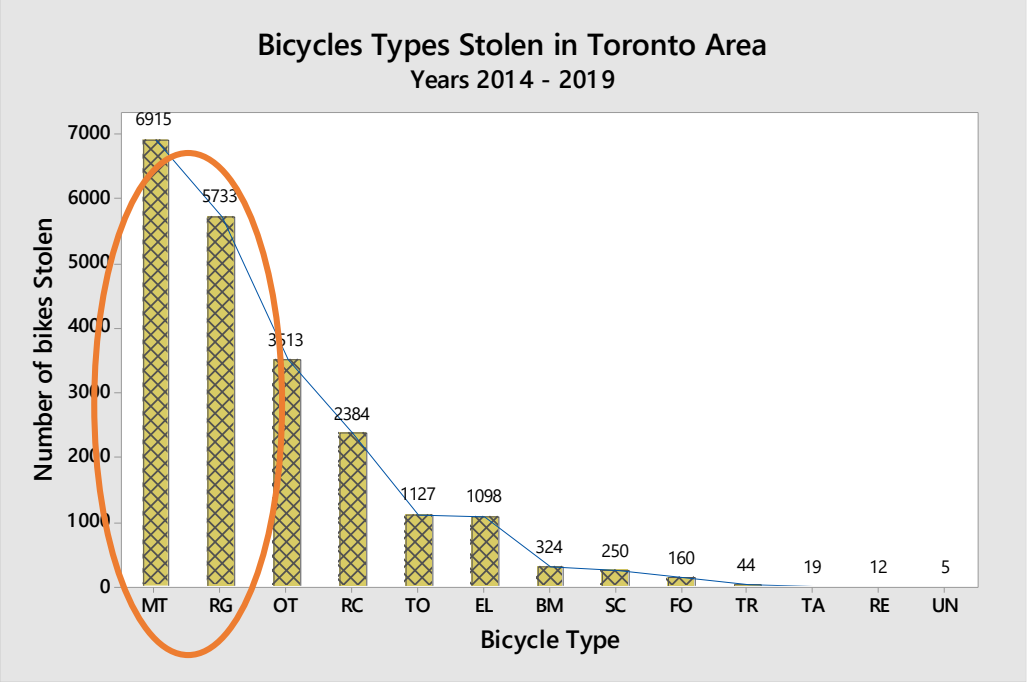


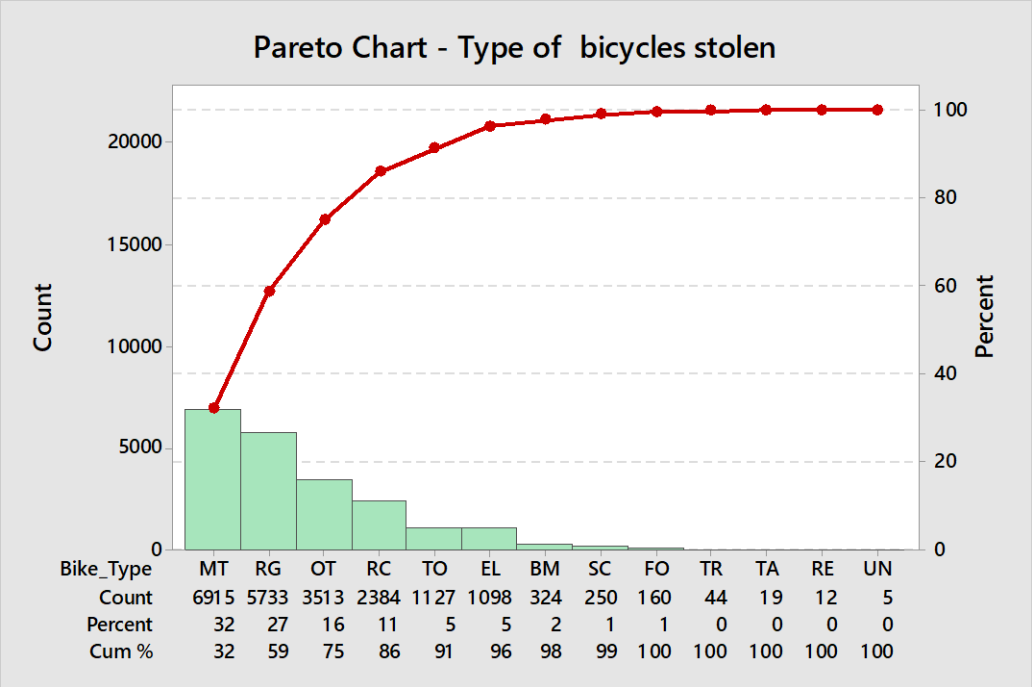
Monday to Friday are the Days with more Cases, with light increment on Fridays. From this Chart we can understand that many people use a bicycle as main of transportation to go to work, study or do another activity on the most of the cases.



The preferred time to steal a bicycle is afternoon between 2:00 pm to 6:00 pm.

2) <u>Bicycle Make</u>

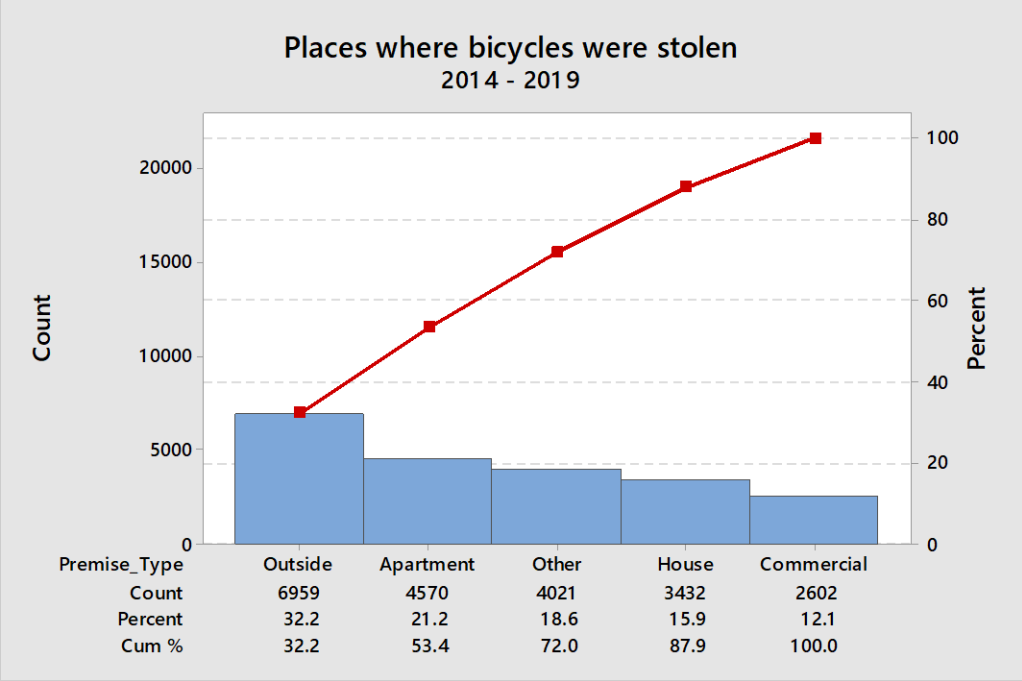




The Bicycles preferred by the thieves are Mountain and Road bicycles with 32% and 27% of the Total.

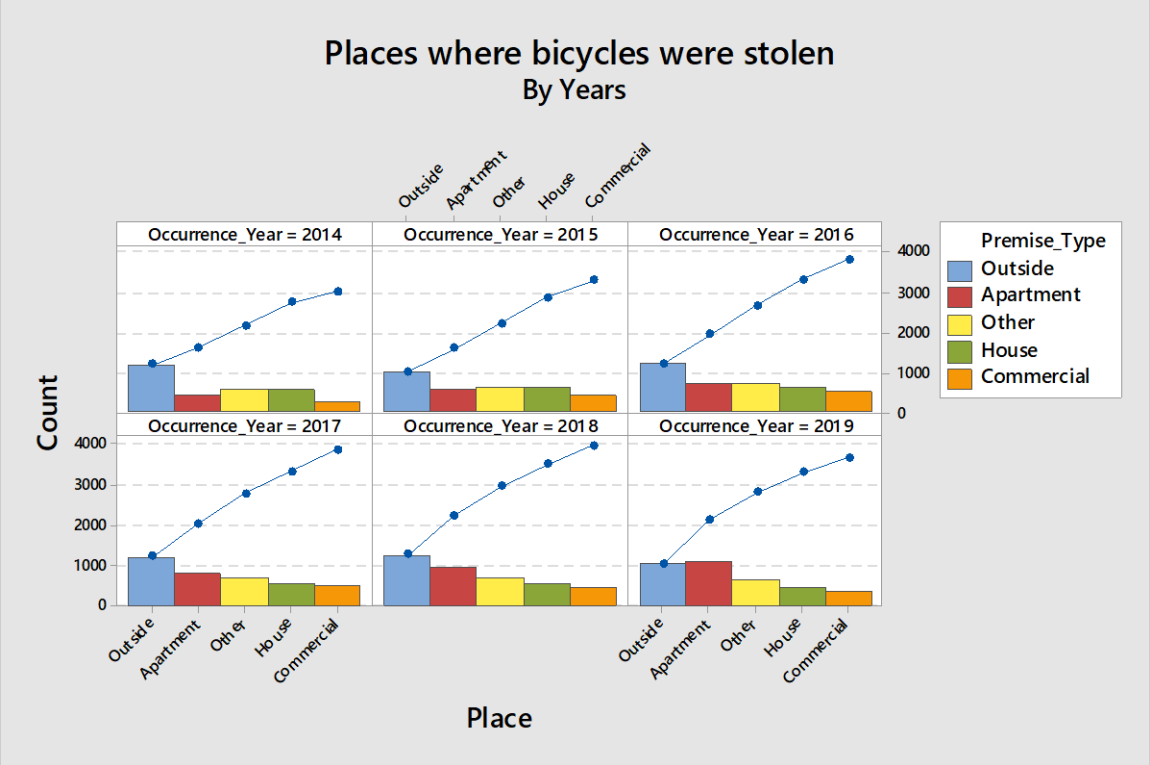
80% of the Total Cases come from 20% of the Types of bicycles. In this case, this 20% comes from Mountain and Road bicycles.

3) Place



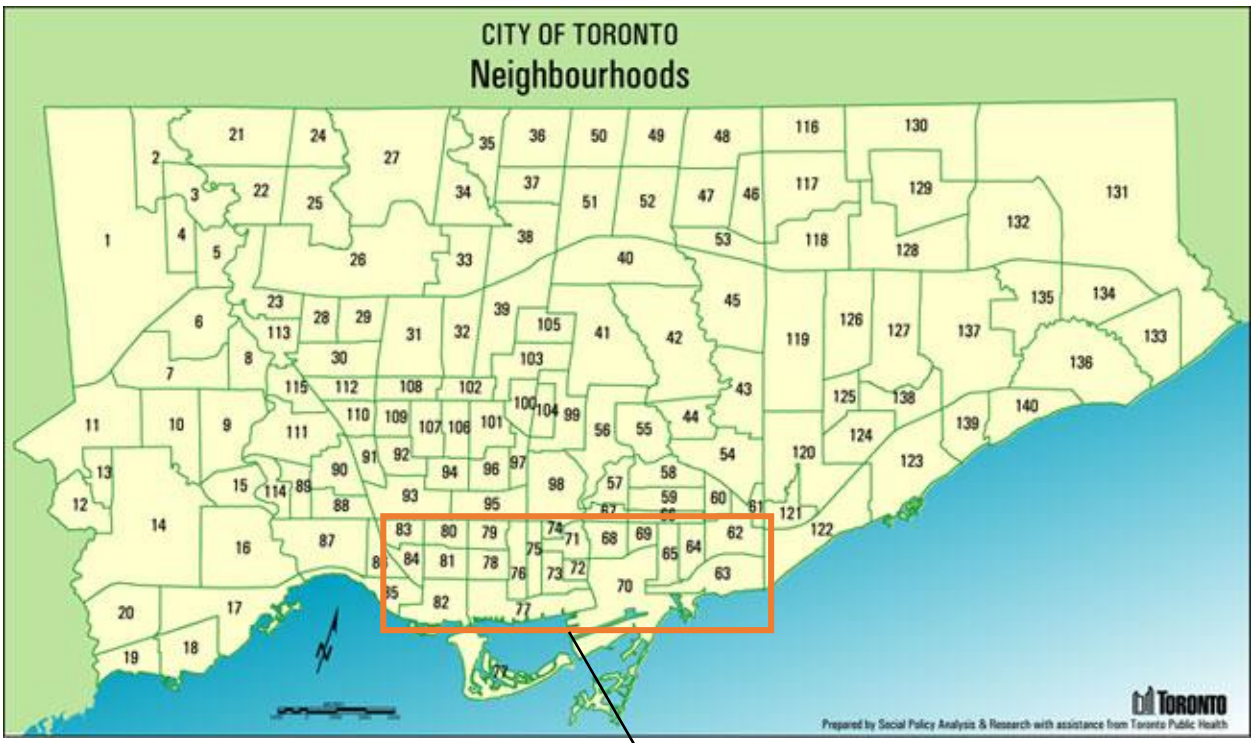
On this graph we can see the places where the bicycles are stolen most. Between Outside and Apartment count for more than half of the total of Cases. Can make sense because, as we analyze

before, Monday to Friday are the days with more incidences. During this period the most of people use the bicycle to go to work, study or does another activity, it's mean that the bicycle is "Outside". On the other hand, another part of the population Monday to Friday go to work, study or they are out of home doing personal activities, it's mean that the "Apartment" is alone with the bicycle inside.



The graph above shows the places where the bicycles are stolen most by years. From 2014 to 2019 "Outside" is the favorite place to steel a bicycle but, in 2019 "Apartment" lightly Overpass "Outside".

4) Neighbourhood



Area with the most Incidences in Stolen bicycles

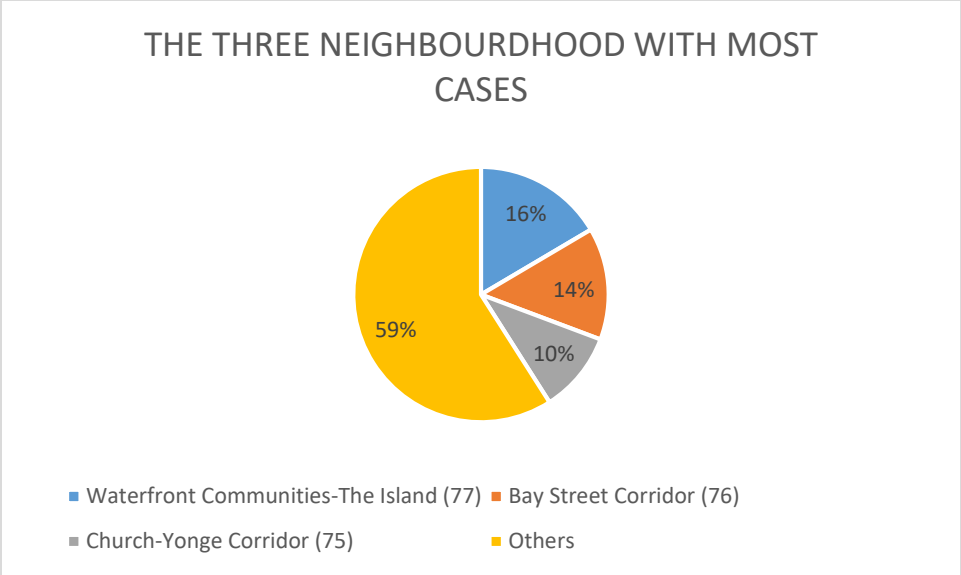
Sheet 1

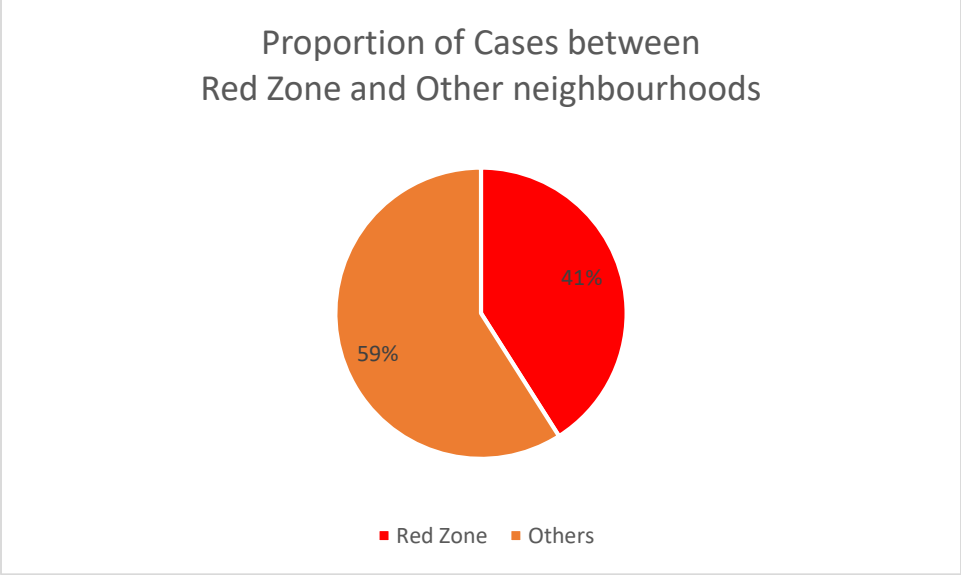
Waterfront Communities - 77

Church-Yonge Corridor - 75

Bay Street Corridor - 76

Red Zone



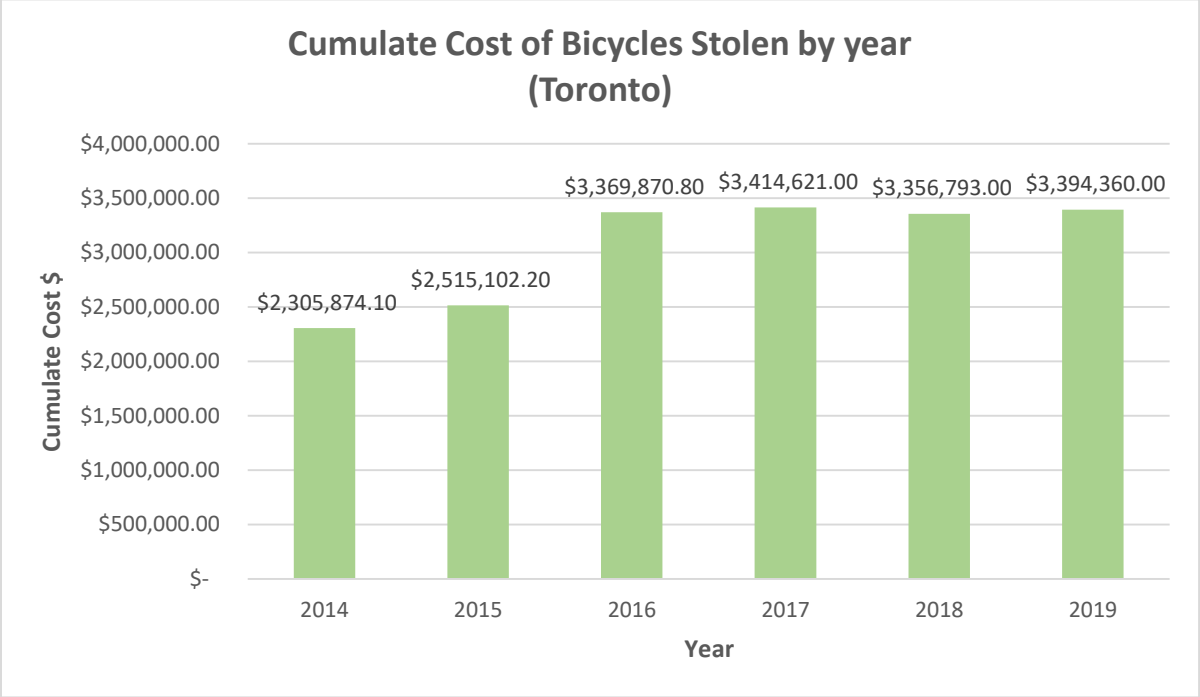


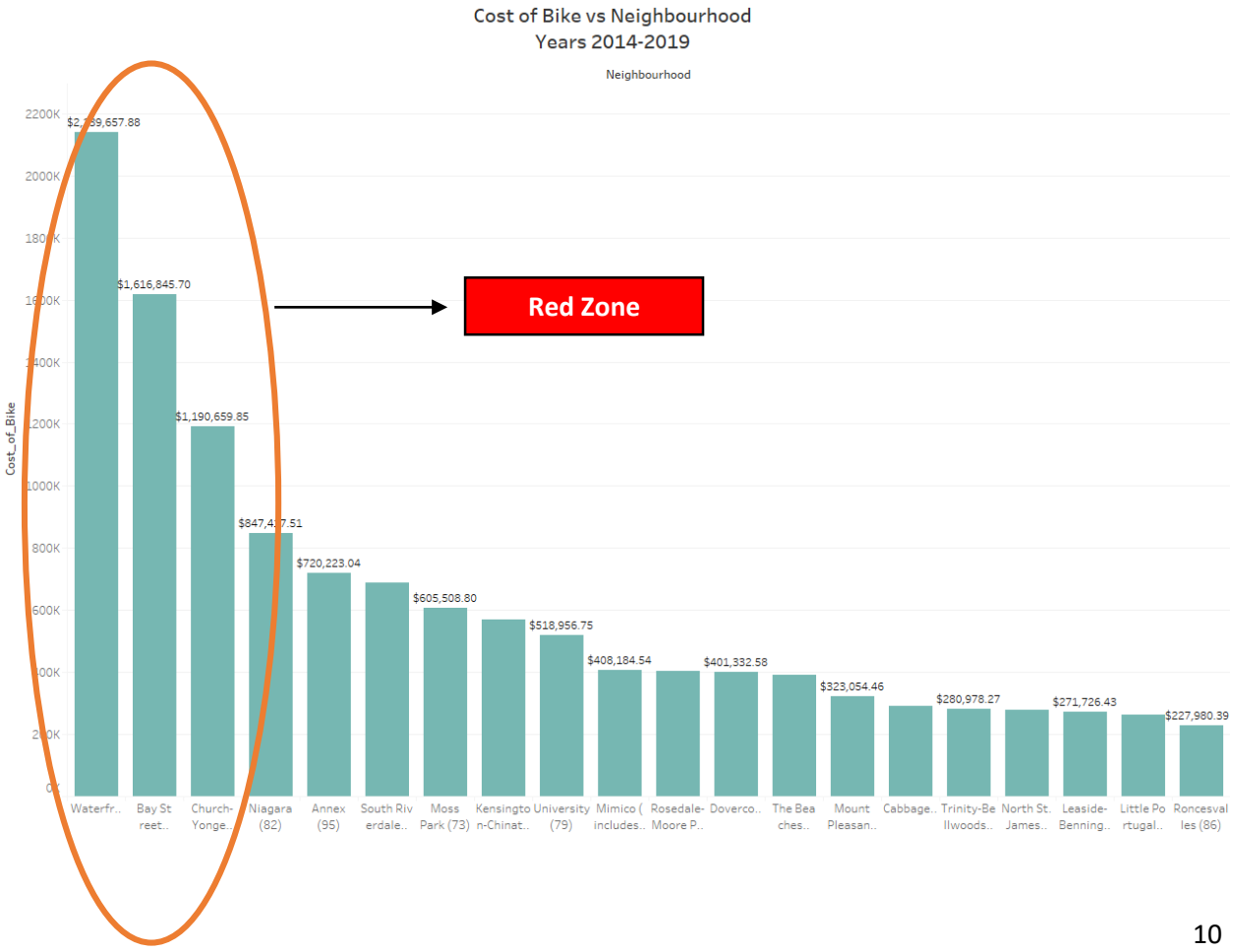
There are three neighbourhoods that show the most of cases in bicycles stolen. We call them the “Red Zone”:

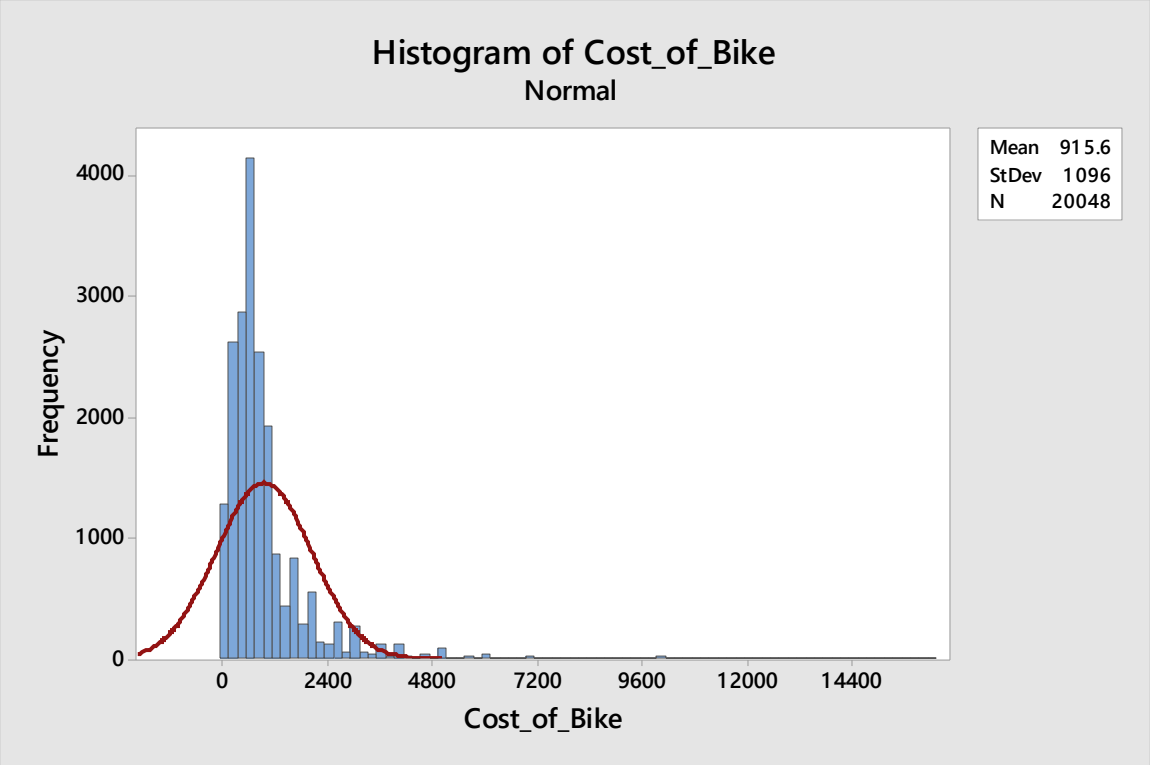
- Waterfront Communities
- Church-Yonge Corridor
- Bay Street Corridor

The Red Zone count with 41% of the cases, we could say that 2 of 5 bicycles stolen comes from these zone.

5) Cost of the Bicycle







Descriptive Statistics: Cost_of_Bike

Statistics

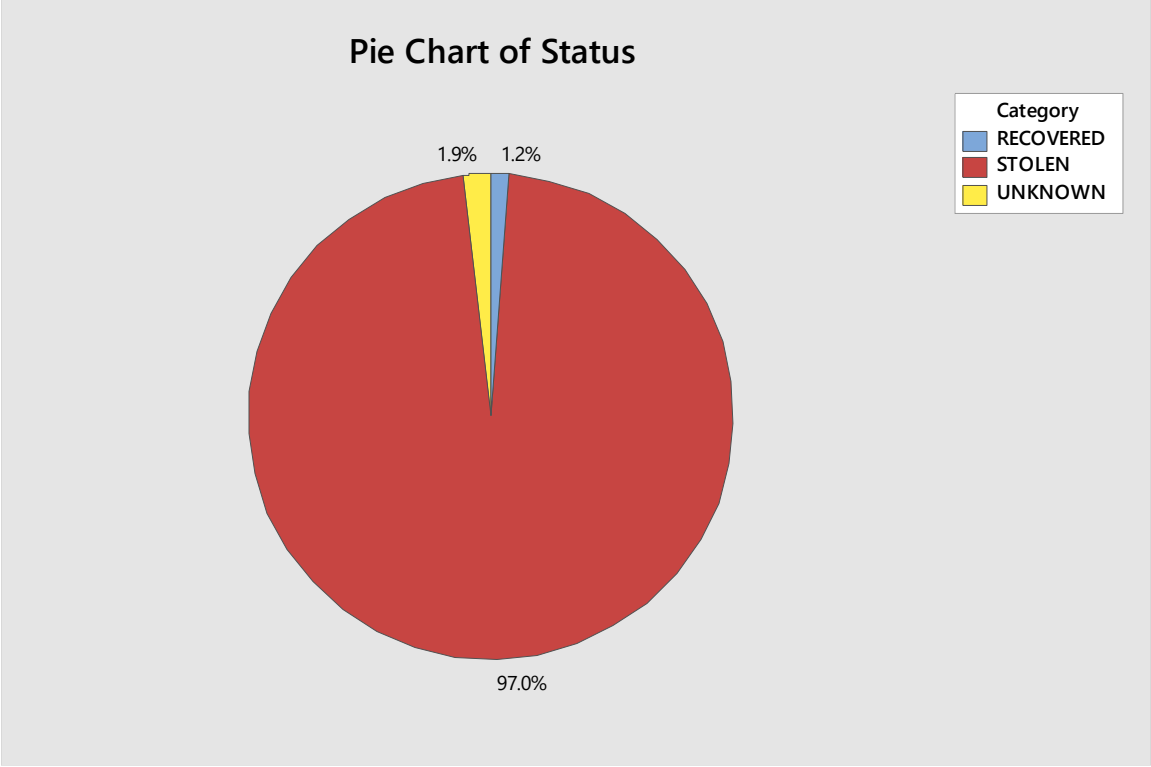
Variable	Mean	SE Mean	StDev	Minimum	Q1	Median	Q3	Maximum	Mode	N for Mode
Cost_of_Bike	915.6	7.74	1096.4	0.00	350.0	600.0	1000.0	16282.2	500	1682

Observing the graph (Cumulate Cost of Bicycles Stolen by year), we can conclude that in one year the average cost of bicycles Stolen is: $ 3 059 436.85. By Day will be $ 8 382.

The Red Zone has the highest value in terms of Cost of Bicycles stolen, that is in direct proportion of the most Cases reported.

The Histogram of Cost of Bike show a Positive Skewness on the curve (Mode < Media < Mean). It's mean that the most of the bicycles stolen have a cost value less than the average value that is $ 915.6. We can observe a huge dispersion on the data since that Standard Deviation is $ 1 096.4 with a Maximum value of $ 16 828.2 and Minimum of $ cero.

6) Recovery Productivity



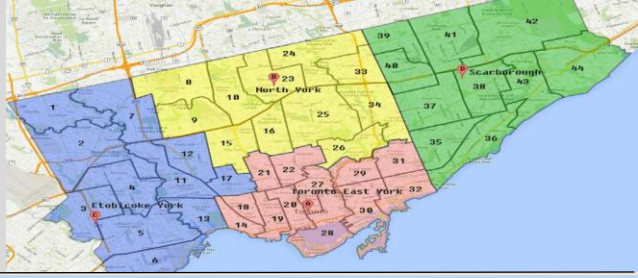
Only 1.2% of bicycles stolen are recovered. In terms of money, we can say that we are going to recover $ 100.6 per day or one bicycle every 10 days.

CONCLUSIONS

- Ten bicycles are stolen a day in Toronto.
- July is the month with more cases. The majority of bicycles thefts occur Monday to Friday with a light increase on Friday.
- The time with more incidence is afternoon between 2:00 pm to 6:00 pm.
- The Bicycles preferred by the thieves are Mountain and Road bicycles with 32% and 27% of the Total.
- The bicycles are stolen from two main places: from Outside (32%) and from an Apartment (21.2%)
- The Red Zone it's conformed by three neighbourhoods that have the most cases in bicycles stolen (Waterfront Communities, Church-Yonge Corridor, Bay street Corridor).
- The Red Zone count with the 41% of the whole cases.
- The average daily cost in bicycles stolen sum $ 8382.
- Only 1.2% of bicycles stolen are recovered. That is mean, each 10 to 15 days one bicycle is recovered.

BICYCLES STOLEN IN TORONTO

REPORT



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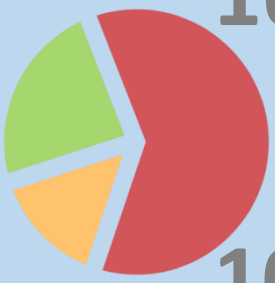
Bicycles Stolen per Day

16%

Of Bicycles Stolen are in July

RED ZONE



16% Waterfront Communities

14% Bay Street Corridor

10% Church-Yonge Corridor

41%

Probability of lost a Bicycle at the Red zone in July

$ 8382

The Cost of Bicycles Stolen per day

JDataone

REFERENCE

- *Toronto Open Data: https://open.toronto.ca/dataset/bicycle-thefts/*
- *An Introduction to Management Science: Anderson, Sweeney.*
- *The Analytics Life Cycle Tool Kit: Gregory S. Nelson.*
- *Managerial Statistics: Gerald Keller.*

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