

Problem Statement:

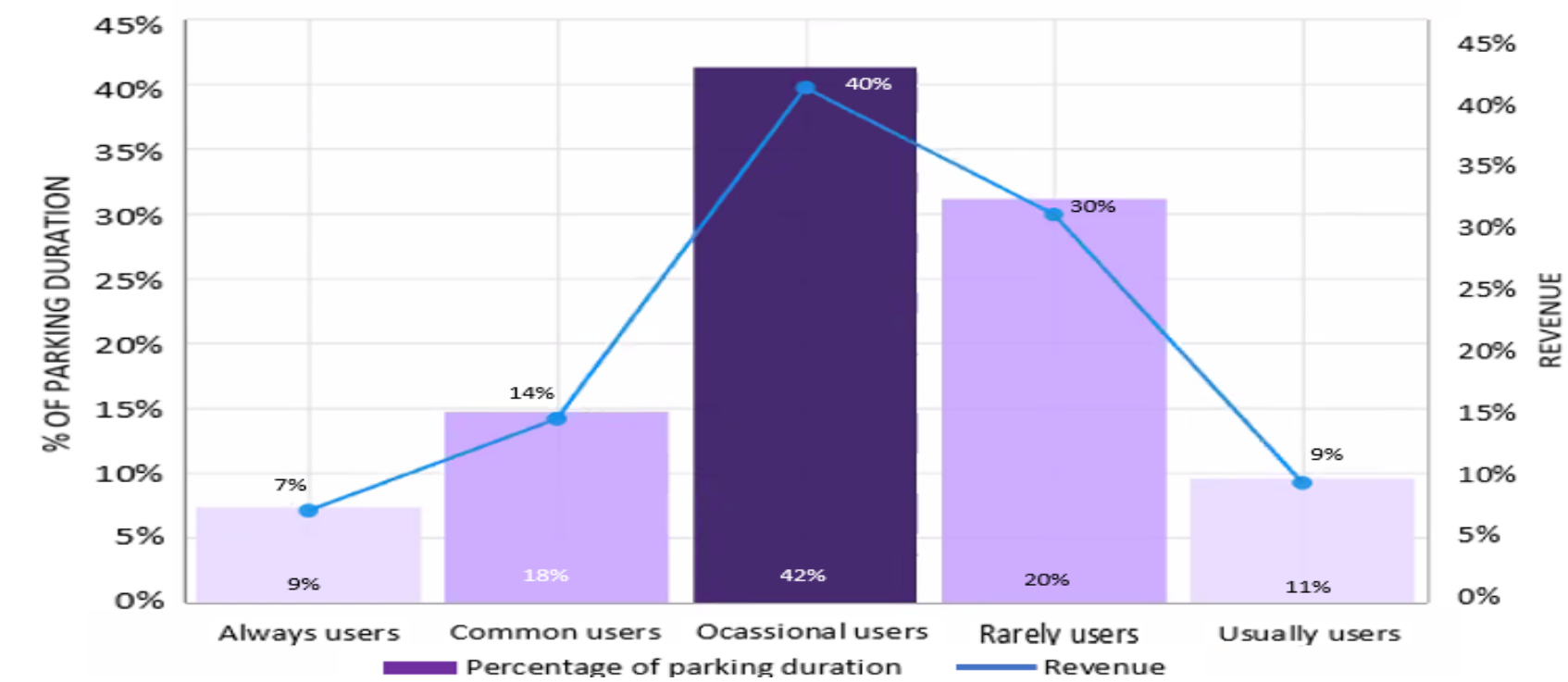
The current public parking service in the City of Hamilton is experiencing a redirection after the unexpected pandemic and new trends on the technologies applied for transactional processes on public parking service and electric mobility. These situations generate unseen opportunities for the city that need to be identified and evaluated to set the next steps to develop updated solutions for the users.

Variables used to get our analysis on track:

- Users' behaviors
- Capacity utilization of parking lots
- Trends of users to buy electric powered cars
- Revenue

Hypothesis:

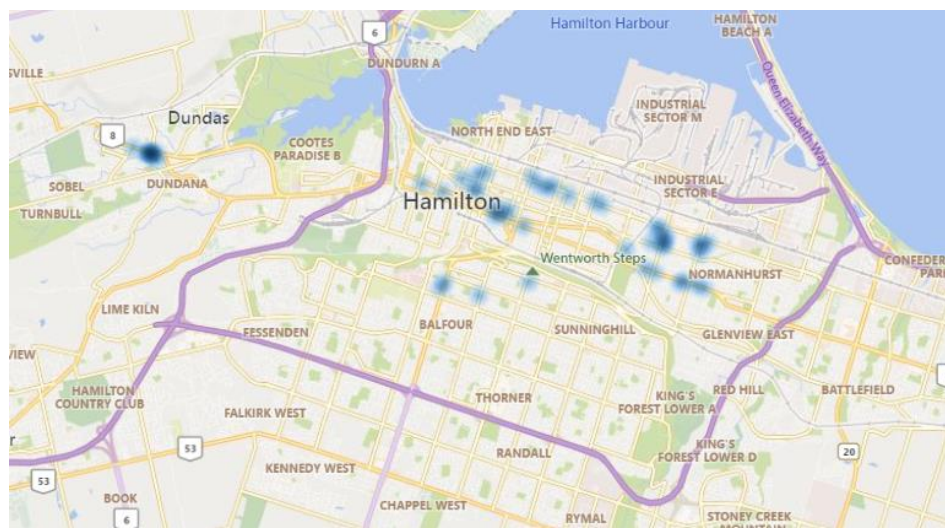
New technologies in parking and new trends in electric vehicles can affect the behavior of the users when using the public parking service.



There were 5 groups of users' behaviour identified based on:

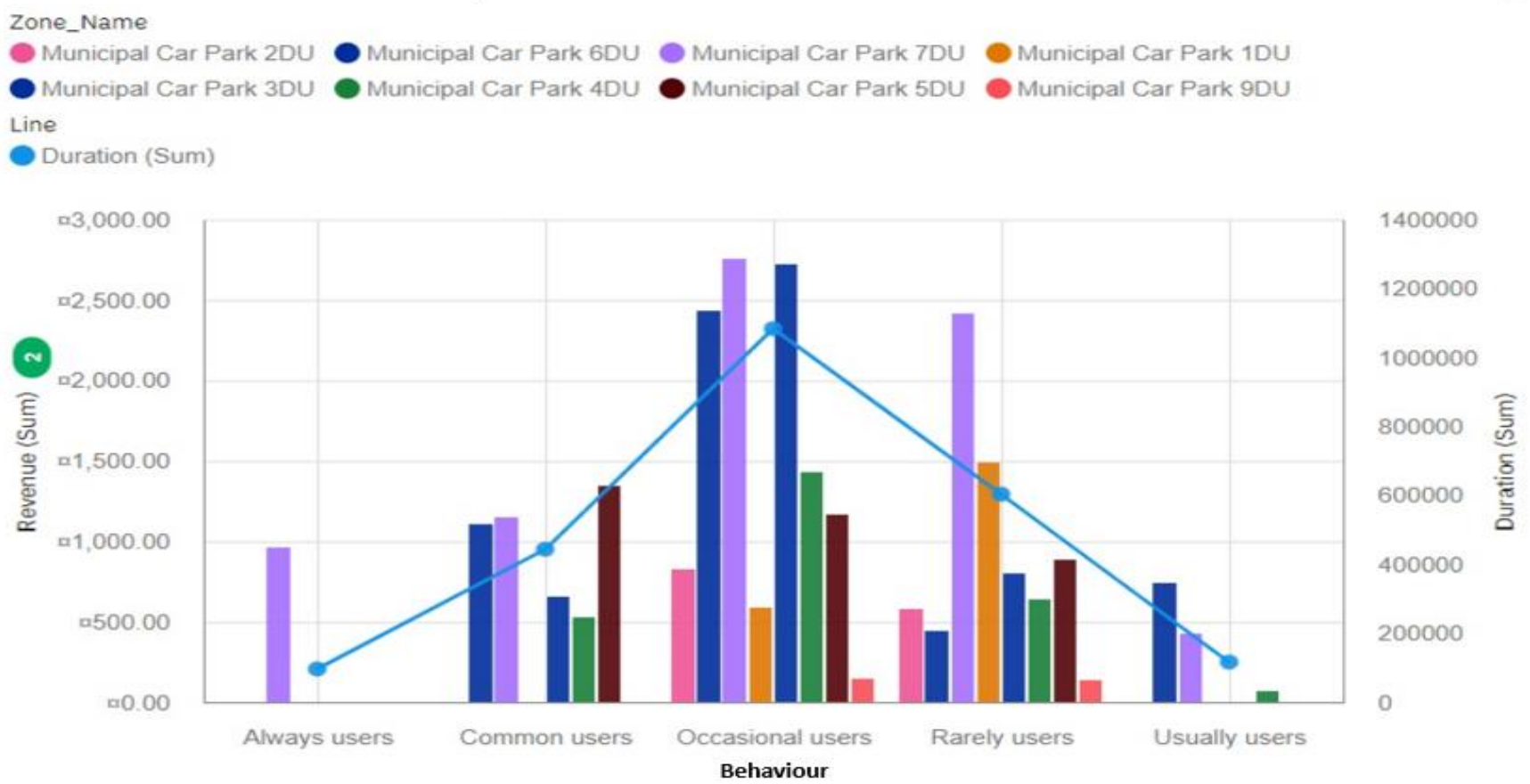
- accumulated parking duration and
- Revenue

The gross of these variables is in the Occasional users, composed of 42% of the total with an average parking duration of approx. 350 minutes. This user groups contributes the highest revenue in the City of Hamilton.



The Heat Map indicates a large portion of parking users are centered around the Dundas area. This indicates a great need for parking especially for rare and occasional user. We decided to focus our analysis on this area.

Duration and Revenue by Behaviour at Dundas Ward



Tools used for the business analytics tasks

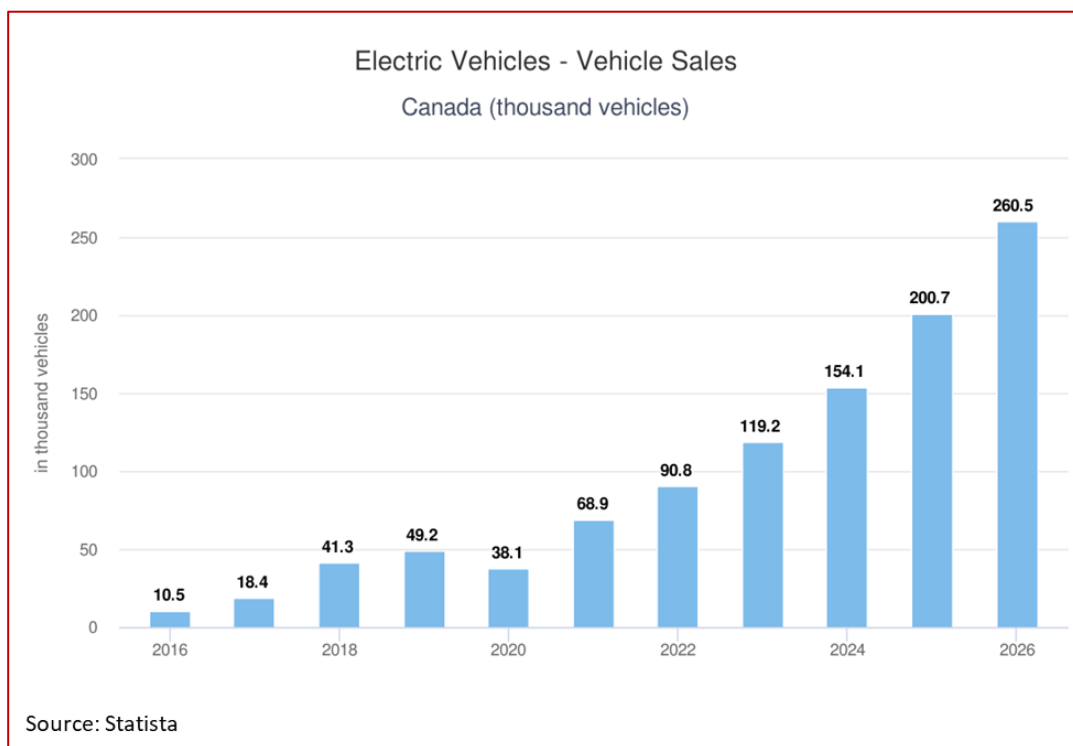


References:

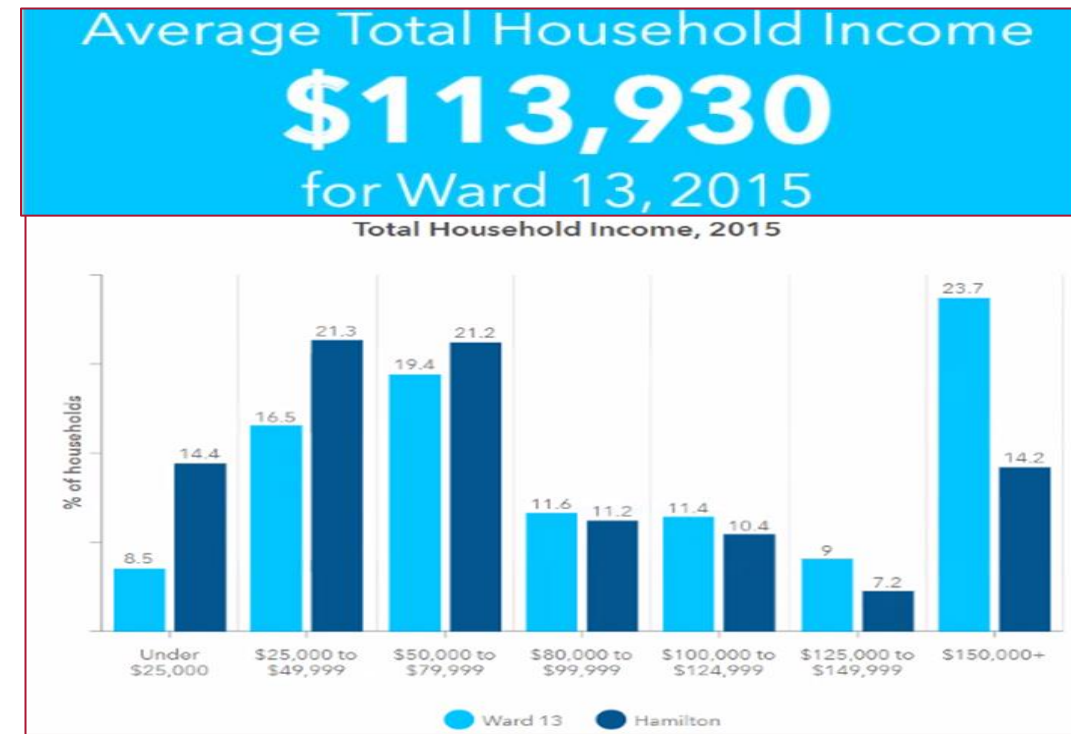


Table: Dundas (DU) ward parking lots analysis by capacity utilization

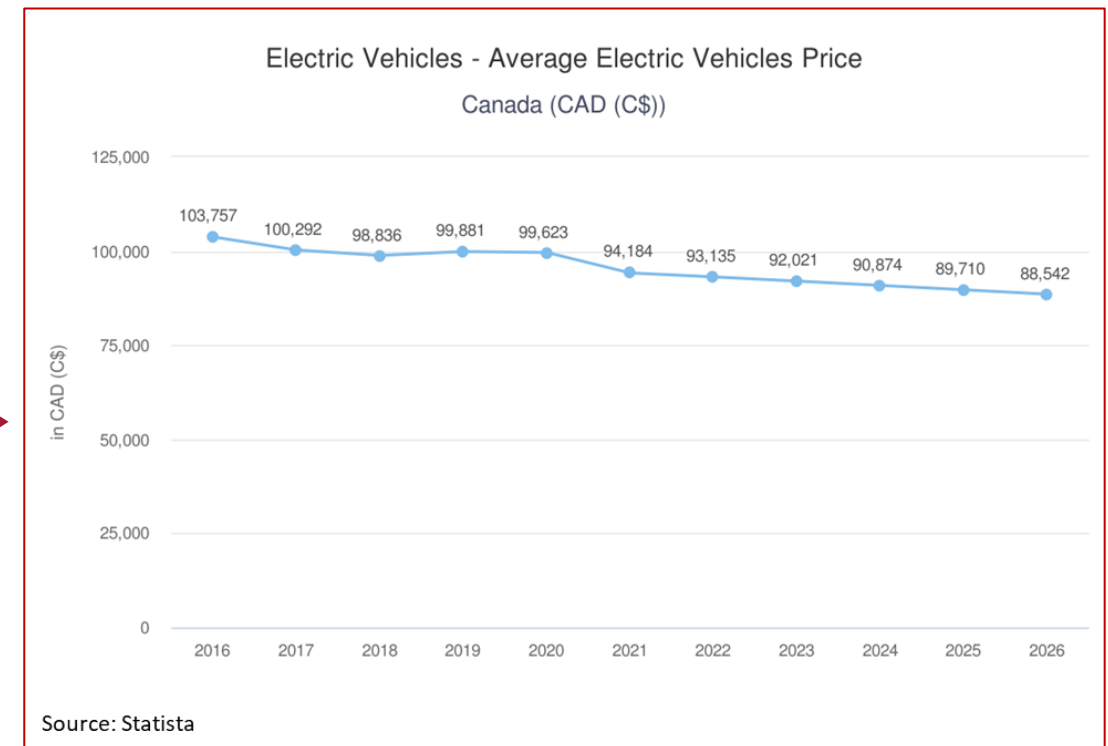
Lot #	Municipal Address	Location	Spaces	Vehicles Parked	Revenue	Assumptions
7DU	23 Hatt St.	Hatt/Miller's Lane	94	5589	7695.413	1.This area is the busiest and contributes the maximum revenue in Dundas's area located in downtown Dundas. 2.The Dundas Farmer's market is the main reasons that attracts a huge number of customers to this parking lot.
1DU	45 King St W	Collins	37	2382	2083.6	1. Most area of this Lot provides street parking making it a little difficult for the customers to find a parking spot leading to underutilization of the parking area.
3DU	82 King St. W.	Hatt/Sydenham (TD Bank)	38	1837	4182.688	1.With the TD bank and Brew company along the perimeter of this lot, we can assume that the minimum stay of 20 min is being used frequently while paying the hourly rate. This would cause an increase in revenue due to high turnover rates. 2.Customers at the bank don't need the hour while the customers at the brew house might use 40 minutes to 1.5 hours.
6DU	85 King St. W.	King/Sydenham (Quatrefoil)	39	1607	4721.55	1. This parking lot is available for the other stretch of Downtown Dundas which is a busy street with the Restaurant ,Quatrefoil located in this area 2. Cast and Forge technologies LTD is a steel fabricator which has its employers and visitors using this parking lot.
5DU	93-111 King St. W.	Wilson's Lane	35	1424	3395.35	
4DU	48-70 King St. W.	Miller's Lane (Royal Bank)	64	1310	2667.625	1. The existence of the Hamilton fire department station can be assumed to be causing the underutilization of this parking area. 2. The Lack of suitable signage for this lot does not exist on any of the entrances.
2DU	8 Foundry St.	King/McMurray (Post Office)	17	1148	1411.388	
9DU	77 King St. W.	Sydenham/King (Bank of Montreal)	7	269	282.625	



Furthermore, since 2016, Canada has seen an upward trend to buy electric vehicles with optimistic future projections.



These are the average household incomes in the Dundas (DU) area that are capable to buy an electric vehicle. The regional average income of the area would also indicate a population of people who fall into the most likely to be able to purchase EV's at this point in time.



Average electric vehicles (EV) prices have a downward trend that could allow more households to be able to buy electric vehicles as gas prices continue to go up regarding to the global current situation.

This can be an opportunity for the City of Hamilton to improve its parking infrastructure, compliment the net-zero initiative and the electric vehicle trend and bring revenue to the city.

Incentives: only 5% of gas car owners know about it

Motivation: concern for the environment

Driving behavior: EV owners drive further and more frequently

Age: higher generational willingness to adopt new technology

GTHA Municipalities should develop strategies to include charging stations at city-owned lots

EV infrastructure in parking spots should be a priority

Recommendations:

- The 4DU parking lot is the initial parking lot for implementing charging stations within the GTHA based on user capacity, low revenue and location.
- The opportunity for funding through the Zero Emission Vehicle Infrastructure Program to reduce investment costs by 50% gives the City of Hamilton one more step in the direction of a net-zero city..
- With an incentive strategy for the parking lot rates and additional incentives for those who use the EV chargers in the parking lots, it would be possible to move users in the Rarely behaviour classification to the Occasional behaviour—benefiting the City of Hamilton of a higher volume of users with a higher average of parking duration.
- We would recommend contacting the party vendors who installed the systems to gather any extra features that the system could support to capture more detail, such as reservation data or accurate structured data on the parking spots—benefiting the public parking analysis tasks for further development.