

**Zipcar and Sustainability**

ZhuoYi Ye 1000405242

Shiqi Liu 1004205004

University of Toronto

EESC34H3S

Dr. Ana Martinez

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**Abstract:**

Zipcar as a new emerging car-sharing program, it has deemed as environmentally friendly, and benefit the user's financial status. In this paper, different perspectives will be explored and compared with the data our team has collected. The main goal of the paper is to identify whether Zipcar is an alternative of a private vehicle, we start our research by getting critical information and questions from Chang et al. The car-sharing companies have used many fuel-efficient cars to reduce carbon emissions, and we would like to challenge the idea in which how efficient Zipcar is. The idea is to branch out to three different perspectives as our goal, through the environment, economic, and social. Another issue to explore and compare in our paper is the sustainability that Zipcar promotes, whether it's up to the standard. The research is done through careful planning and will suggest future recommendations.

*Keywords: Zipcar, environment, economic, sustainability, carbon emission*

## **Zipcar And Sustainability**

### **Zipcar and Sustainability: Introduction**

Zipcar is a car-sharing company that was originally founded in America in 2000. Zipcar provides automobile reservation services and billable by different time frames. Our target on researching regards Zipcar is to find out how much cost could each Zipcar potentially saves for individuals and how much less energy consumed compared with traditional vehicles. Since the UTSC is promoting sustainability on campus by introducing several Zipcars. Our scale was determined to the campus level at first. Hence, this raised the main hypothesis of our project. Is the car-sharing model truly beneficial in different aspects (Environment, social, economic)? There have been previous studies done by Chang et al. The article was written from an Economical point of view, but by branching out to another two perspectives, environmental and social. Which at the end to see if sustainability would persist? Not only the fuel consumption and carbon emission matters but as well as owning a car vs. maintaining a private vehicle. We need to analyze Zipcar as a company to see if it reduces transportation costs for students and staff. Otherwise, if the University of Toronto Scarborough (UTSC) decides to adopt a larger scale of Zipcars, then fewer students will drive their vehicles to school or lunch while being gas efficient and positively impact the environment. The essential questions we are trying to answer is it true that Zipcar would benefit the environment near our municipal level, provincial level. Reducing transportation pollution caused by students and staff while operating their vehicle to school. Another question would be will Zipcar be the mainstream transportation method adopted by other universities and be sustainable throughout. Zip car on campus will help sustainability such as reducing pavement of parking lot, with more buildings being built on campus, admission population will be higher. The admission population means more students are coming on to

campus with yearly growth. Students using private vehicles to transport to school means more parking lot must be built for all the students to arrive at class on time. Before bringing in Zipcars, the campus would have more pollution due to the fact the student population is increasing every year. But partnering with Zipcar to provide vehicles to us will limit the pollution and potential environmental impact. UTSC has built new buildings every year and still expanding. When more students are admitted to UTSC, therefore more parking lots would be built and cause an environmental issue for when paving the parking lots. Also reducing traffic near the campus will benefit the city, open more space for bike lanes and resolve student transportation issues as well as reduced carbon emissions. Currently, there are three Zipcars on the UTSC campus available. they are located at the parking lot behind the instruction building. we are looking to advocate the popularization of Zipcar through this project. and hopefully, after presenting our preliminary research, readers will have a more detailed view towards this new transportation method.

### **Zipcar and Sustainability: Methods & Calculations**

Students and staffs on campus are the main focus, alongside company Zipcar, and families of the students that attend UTSC and the people that work within the community. Hierarchy is present since students and staffs are the ones that most affected, secondly, with parents reduced the rate of sending kids to school will also allow parents to have more time to get to work. The employees of shops and companies will get to work on time, but they 珍 e less impacted since they already know the traffic is congested. Another focus would be the environment in Canada due to carbon emission being less than before, after adopting Zipcar. The methodology regarding data collecting in this project includes two parts. In the first part of this project, one actual Zipcar on the UTSC campus was rented for actual fuel economy, carbon emission and cost associated with rental data to be collected and testified. By a collection of the

exact fuel economy that a Zipcar vehicle and through comparison with the average fuel economy of a private vehicle, it is not hard to find a gap between the two. This difference in fuel-saving could then be magnified by multiplier effect whenever a different index of population-level was involved. The number in the fuel saved also has a direct relationship with carbon emission by formula (Refer to Figure 3). However, the fact that the data from one Zipcar vehicle does not necessarily represent the mean value for the entire Zipcar vehicles offered to the market. Thus, by collecting the data regarding fuel economy and carbon emission from the natural resources Canada, professional car emission tools from CAA and our data collection from actual practices, by focusing on the car models offered in Canada market, a more depth view of the difference between an average private vehicle versus the Zipcar was acquired. This will be converted into numerical results later.

The second part involved in this project regarding the methodology is survey conduction. The survey conduction that we originally planned to carry out on campus was terminated due to the outbreak of the COVID-19. However, thorough the survey (Refer to Figure 5), the goal is to establish a database of around 100 people that are mostly focusing on students and staff that commute between the campus and their home. This survey gives the percentage of people that will take a chance on trying a new transportation method. The mean goal is to examine the willingness that people would give up a private vehicle and switch to Zipcar. This can be projected to campuses around Canada and North America. In the end, it will give the data required in finding the percentage of reduction in either CO<sub>2</sub> emission, economic impact or even parking space-saving, etc. Which are various on different age, occupation and income level. For more information on our steps for data collection, refer to Figure 6.

## **Zipcar and Sustainability: Results & Discussion**

From the environmental aspect of the project, the reduction in CO<sub>2</sub> emission is one of the focus of this project. From the data collected in part one of the methodology taken. The car models that in the comparison are exactly the models that Zipcar offers in the North American market. The four models that Zipcar offered in Canada are Ford Focus, Honda Civic, Honda CR-V, Mercedes-Benz C300, and Jeep Wrangler. These four different car models representing the four categories of vehicles: family sedan, luxurious sedan, city SUV, an off-roading vehicle. The trim Zipcar offered for each model also is relatively environmentally friendly and has outstanding fuel consumption in its class. By retrieving the fuel consumption, the average annual CO<sub>2</sub> emission from these models, an average result of 3895 kilograms of CO<sub>2</sub> emission annually was obtained. On the other hand, the average private vehicle produced around 4600 kilograms of CO<sub>2</sub> annually. (Refer to Figure 1) There exists a gap of 705 kilograms of CO<sub>2</sub> emission between the two. Also, Zipcar is now adopting more and more hybrid and pure electric cars into the market through our researches, which will be no doubt that further reduce the CO<sub>2</sub> emission to a certain extent.

In our results. One Person = 705kg annually carbon reduction which equals to 0.705 metric tons. Canada's 2018 carbon dioxide emission is estimated to be 575 million metric tons are 11% is from automobiles and light trucks. (Government of Canada, 2018). 11% of 575 million metric tons is equal to 63.25 million metric tons. When we multiply the licensed drivers in Canada in 2018 (22 million) by 0.705 metric tons per capita from our result, and the result would be 15.51 million metric tons and equal to 24.5% reduction overall in carbon emissions. These results mean that when every driver in Canada switches from private vehicles to Zipcar usage completely.

From an economic perspective, we want to look at the cost of operating a private vehicle. Zipcar data vs our vehicle data estimates from receipts of car maintenance and gas per year, along with trips we take approximately per year. The data is then projected onto a temporal scale to estimate the annual cost. By branching out to spatial scale (city, and country). We could see the numbers would increase by the multiplier of people that switch from private vehicles to using Zipcar. By multiplying with the population that switches from private vehicle ownership to full Zipcar usage, the results would be clear.

Average Expense on car monthly is around 300 dollars, average private vehicles are 800 dollars, by broadening the spectrum, the average expense on car annually will be significant. Zipcar being 3600 dollars, while the private vehicle is 9600 dollars. The difference between the 2 is 6000 dollars/year that could be spent elsewhere instead of spending on transportation. The impact on a global scale would also be multiplied by the people that already own a private vehicle and switched to Zipcar completely.

### **Zipcar and Sustainability: Recommendations**

Since in this paper, the perspectives that were covered, even though originally planned was the three main perspectives in environmental, economic and social. But the last and the as important role in the three views have not been completed, it is best for other peers and future students of the course can pick up where our team left off and continue to work on Zipcar as it is a beneficial and sustainable project from our results and discussions. With more and more private vehicle ownership, it is better to increase the use of the car-sharing program and would help not only reduce carbon emission but also help with financial status. Due to unseen circumstances as the COVID-19 virus outbreak, the social perspective has been taken out, the social perspective is the one we sacrificed.

### **Zipcar and Sustainability: Conclusion**

Through the data we obtained, we realized that by switching to Zipcars. An individual could potentially save up to \$6000 annually in transportation. Furthermore, there will also be a 15.3% reduction in CO2 emission per vehicle annually from 1 person switching completely, but 24.5% total reduction if everyone in Canada is a licensed driver switched. The results that came in were not only applicable to only Canada, but the globe as well if the same model and the same methods were used. The impact on a global scale and national scale by using simple calculations with multiplying with the population for people that switched to Zipcar usage completely. One step towards finishing this project including sharing the result from our surveys to the Zipcar headquarters. Hopefully, we could obtain some professional suggestions and feedbacks from Zipcar to polish and finalize our project. Unfortunately, as the COVID-19 became violent, the closure of the University facilities also terminate our survey plan.



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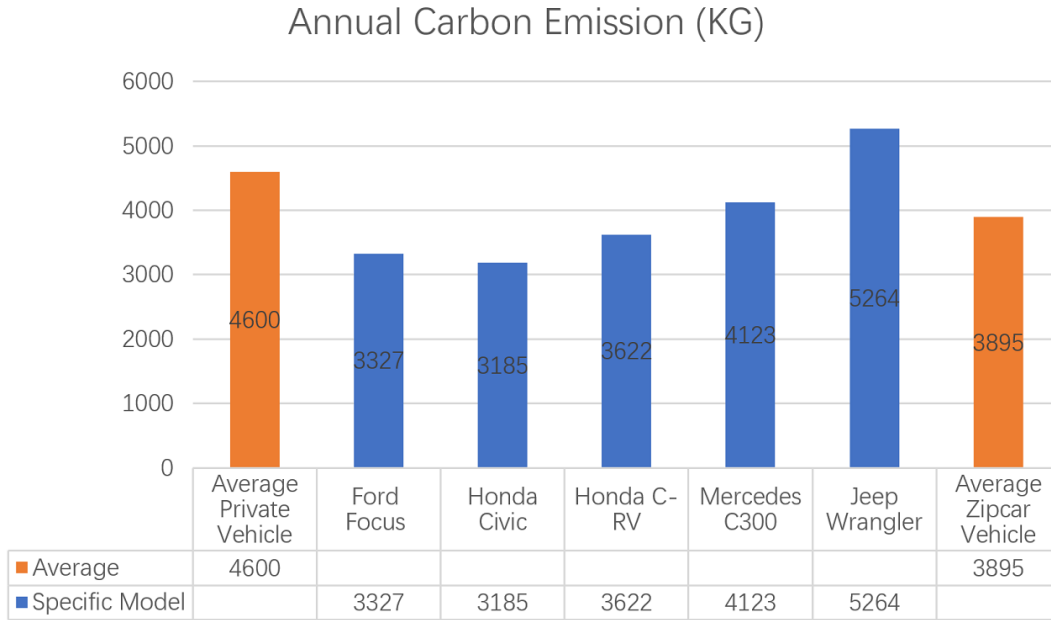
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**Appendix:**

**Figure 1.**



**Figure 2.**

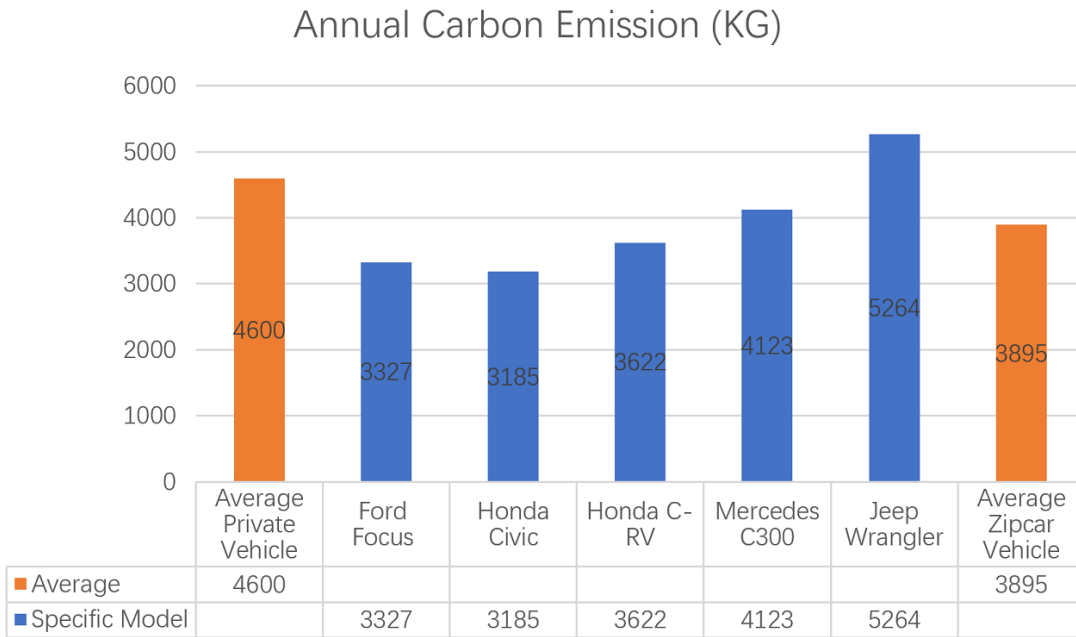


Figure 3.

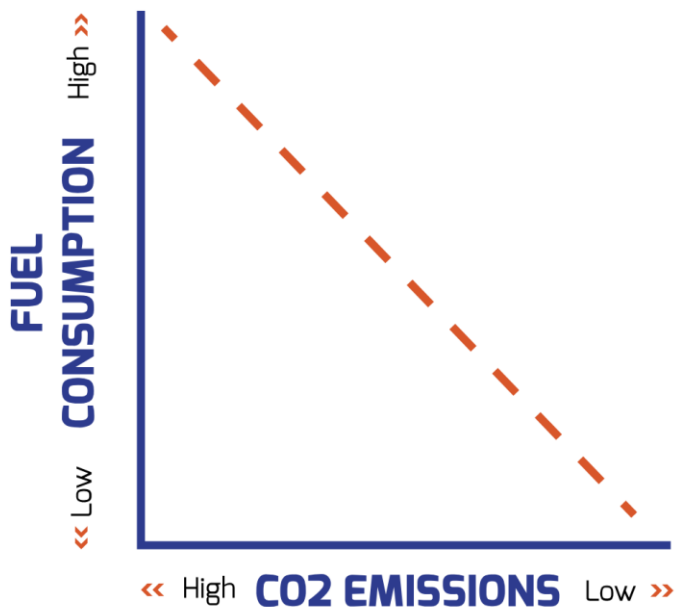


Figure 4.

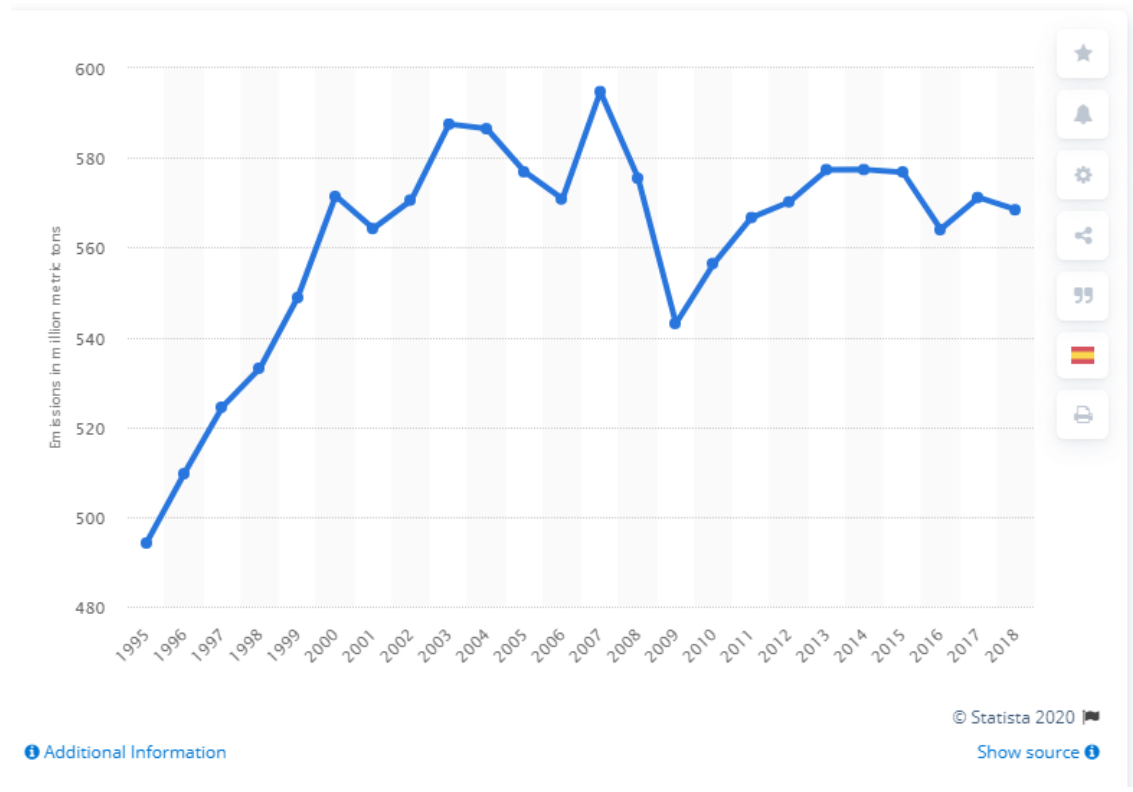


Figure 5.

## SURVEY SAMPLE QUESTIONS

Questions	Option A	Option B	Option C	Option D
1) Have you heard/used Zipcar?	Yes	No	Rarely	Often
2) Average Commute Time	Within 10 mins	Within 30 mins	Within 1 hour	More than 1 hour
3) Transportation used to get to campus	Bus	Private vehicle	Walking	Zipcar
4) Do you own a car? If so, estimate how much do you spend on maintenance, insurance and gas PER MONTH?	\$0-300	\$300-600	\$600-900	>\$900
5) Will you use zip car in the future and why	Record feedbacks	Record feedbacks	Record feedbacks	Record feedbacks

Figure 6.

## DATA COLLECTION

- Step 1: Join Zipcar membership
- Step 2: Test Zipcar for fuel consumption/cost
- Step 3: Quantitative: Compare Data with private car
- Step 4: Calculate data obtained based on population in different levels (Community, Toronto, Canada)
- Step 5: Qualitative: Conduct survey and analyze survey
- Step 6: Improvements needed to boost general public usage.