Sharing Economy: Do E-Scooters Make the Cut?

Brady Bailey, & Sarah Sereda

Abstract

Sharing is as old as civilization itself. Corporations are now taking an old idea and creating a strategic model with the help of technology. This modern sharing economy, while having roots in sustainable practices, can often be mistaken as an inherently sustainable business model. In this paper, we present the outcomes of a project on e-scooters as an example that emphasizes the potential impacts and characteristics of a business operating within the sharing economy. To understand and gain public opinion, a survey was conducted gathering 222 responses regarding e-scooter usage in Edmonton, Alberta. Another source of information was the interview with a top executive of Lime Scooters, an e-scooter company operating in Edmonton. We found that while online platforms make resource sharing between peers easier to access, they are not always economically sustainable. Literature review on life-cycle analysis of e-scooters revealed that environmental sustainability is also not ingrained in practice, and careful consideration of business operations is needed to mitigate potentially negative impacts. In addition, thoughtful policies need to be considered and put into place in-order to encourage public and private trust. Overall, the sharing economy can be quite effective in creating a sense of community and social sustainability, but it should not be graded as a wholly sustainable practice without evidence.

Key Words: Sharing Economy, E-Scooters, Sustainability

Problem Definition: While exploring an example of the sharing economy, how sustainable are sharable electric scooters?

1. Introduction

Throughout history, economies have evolved, shifting from mere barter and trade of local goods and products, to mass globalization, which has made products available from all corners of the world. Collaborative consumption and the sharing economy are rooted in sustainability and the efficient use of goods and resources. Mitigating the overconsumption of goods is a critical factor in sharing economy models in order to reduce the overall environmental, ecological, and societal impacts consumption has. Many published papers show that there is still no consensus on what collaborative consumption, or the sharing economy, is, and although tech platforms dominate the modern sharing economy, what ‘is’ and what ‘is not’ a sharing economy can be hard to decipher and separate (Bradley & Pargman, 2017).

To explore people’s perceptions about sharing economy, we carried out a discussion amongst our classmates in a senior level course at MacEwan University (MGTS 497: Special Topics in Social Responsibility and Sustainability Management). As part of the discussion, we showed our classmates a list of company logos and asked them to distinguish whether or not these companies were part of the sharing economy. These included both internet-based companies (Netflix, Google, Facebook, Amazon, Uber, and Pogo), and traditional brick and

motor-based organizations (Toyota, Edmonton Public Library, and Start-Up Edmonton—a co-working space).

During the class discussion most people felt that Netflix, Google, and Facebook were part of the sharing economy. This was potentially due to the global brand these companies possess and being frequently marketed as prime examples of sharing economy. Interestingly, while some people felt that Edmonton Public Library was a modern example of sharing economy by virtue of its focus on sharing resources within a community, others were unsure. Overall, there seemed to be a lack of clarity as to what constituted sharing economy and how to identify businesses that truly contributed towards it. This lack of understanding led us to write this paper, in which we have tried to define sharing economy and follow it up with a case study on e-scooters. We begin with a brief history of how sharing economy has evolved, followed by an extended discussion on e-scooters managed by Lime company. Our paper is based on review of relevant literature, interview with company executives, and a survey with 222 respondents regarding e-scooter usage in Edmonton, Alberta. The literature was located within MacEwan Library databases, Google Scholar, and popular web-searches via search engines. Data on life-cycle analysis of e-scooters was obtained from research conducted at North Carolina State University.

2. Sharing Economy: Old and New

Sharing is as old as humanity itself. Its purpose is to maximize utility and efficiency through sharing of goods and resources (Rinne, 2017). Collaborative consumption is at the essence of how a sharing economy functions. Collaborative consumption is defined as "...events in which one or more persons consume economic goods or services in the process of engaging in joint activities with one or more others" (Felson & Spaeth, 1978, p.614). To further understand what the sharing economy is, and what it has become through technological improvements, we can break it down into four waves. The four waves are not strongly defined boundaries; we see them as way to help structure new businesses and market segments, which are evolving mainly by technological improvements or shifts (refer to table 1).

Table 1: Waves of Sharing Economy

Waves	***Approx. Timeline***	***Examples***
1st Wave	600s-1700s	Libraries, Universities, Hackney Carriage
2nd Wave	1700-1930s	Modern hotels, modern taxi-service
3rd Wave	1930s-1980s	Clothing rentals, video rentals
4th Wave	1990s-2000s	eBay, Craigslist, Coworking/hacker spaces
Modern Sharing Economy	2010s-Present	Uber, Rent the Runway, Lime, Bird, Airbnb

Source: Class Discussions, MGTS 497, MacEwan University

1st Wave

The first wave of organizations that incorporated sharing dates to the middle ages and before. For example, universities, libraries, and community gardens shared resources through collaborative means. To keep local communities strong, community gardens held the resources to feed and foster the local population, with everyone sharing the local resources such as agricultural tools and pooling crop yields. Libraries had systems of loaning personal books donated by others (Felson & Spaeth, 1978). Similarly, universities mediated between those that wished to learn (students) and those who were sharing their knowledge (professors). Medieval inns and coach inns were used for hundreds of years as lodging for travelers who did not have a fixed address or location. A major example seen in the later time of this wave was known as a "hackney carriage", which was a coach attached to a horse as transportation for hire. Notably, one of the first transportation laws, known as the *Hackney Carriage Act* (English, 2012), was passed in England in 1635. These are a few examples of how groups collaborated to share resources to maximize efficiency through use of goods and services.

2nd Wave

During the industrial revolution, the first indicators of the modern-day sharing economy were seen. An example of this is the taxi service, born after the invention of gasoline engines. These taxi services disrupted traditional transportation which was horse and carts or hackney carriages. The birth of taxi services gave access to travel to those who could not afford the luxury purchase of a car during that time. The world's first modern taxicab service was created by Friedrich Greiner, who used the idea and invention of Gottlieb Daimler, a founder of global car brand Mercedes-Benz. Greiner was a German entrepreneur who previously owned a fleet of horse and carts for hire. He then went on to operate the first known modern taxicab service in Stuttgart, Germany, using Daimler's Victoria-styled combustion vehicle, which was fitted with a taxi meter (English, 2012). Luxury hotels began to rise in large metropolitan areas as travel became more accessible across international waters, and train systems gained popularity. A hotel business model was based on the concept of distributing the fixed cost across many users, boosting the efficient use of the building as a hotel.

3rd Wave

To enable access to resources, businesses got more innovative as technology continued to develop. Video and media rentals gained traction as there was a need to open the access to mass consumption. Companies such as Blockbuster allowed consumers to share the cost of a massive media library through rental fees. Consumers were able to rent (share) the massive library of resources, thus sharing the fixed cost across millions of users. Clothing rental companies opened access to those who could not afford to purchase an entire suit or formal wear. These companies owned a batch of clothes, which cycled through the renters who shared the fixed cost of the collective wardrobe.

4th Wave

The dot-com boom shifted the ability to access information and resources. At the forefront of this technological shift were companies such as eBay, Kijiji and Craigslist. Open access to the internet now gave consumers access to platforms that could connect peers to peers on a much larger scale. These platforms allowed consumers to buy, sell, and trade resources and goods through an online system compared to the traditional system of a physical location to distribute goods and resources through a centralized agent. Coworking spaces were also created in this wave, disturbing the traditional office work environment; the first physical coworking space was established in San Francisco, 2005 (Neuberg, 2014).

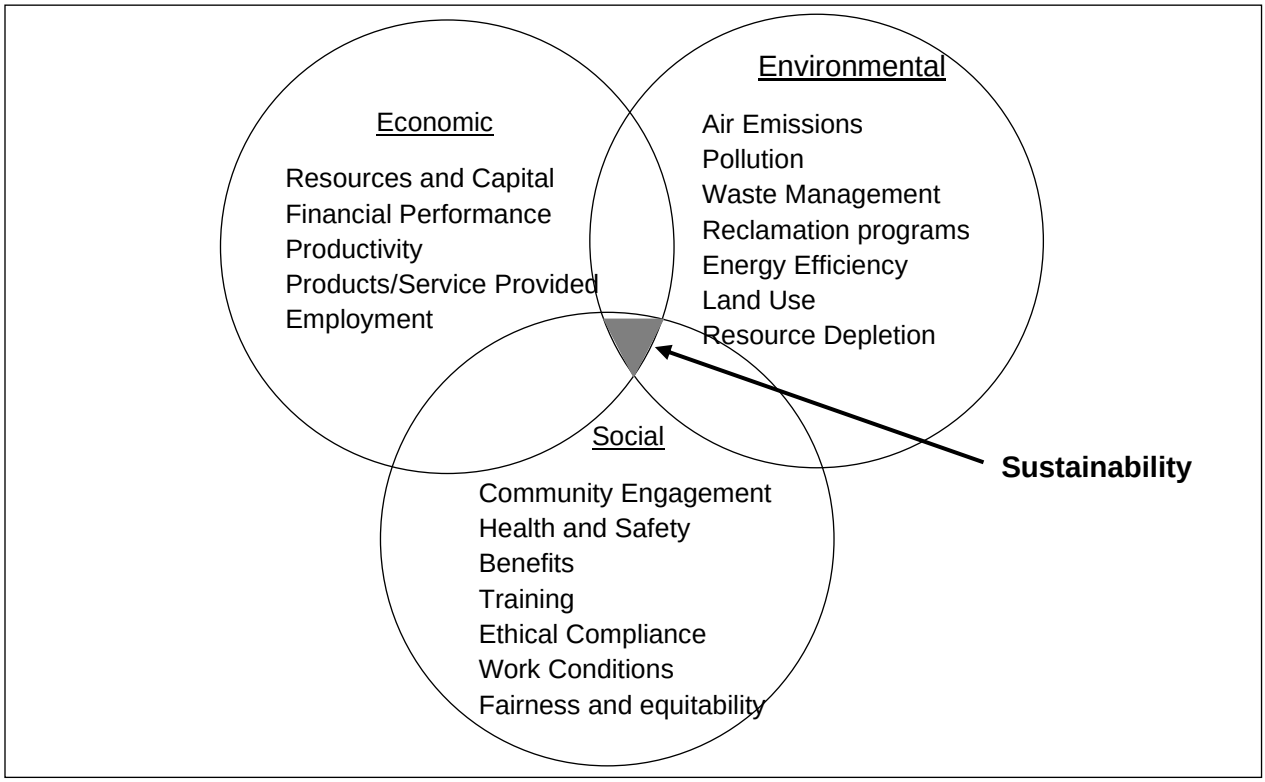
Modern

Modern companies or platforms that provide open access to resources or freelancers are hard to fit in a box, therefore it is necessary to view the modern sharing economy as a spectrum rather than a “one-size fits all.” Furthermore, the modern sharing economy can be described as a peer to peer, socio-economic model, which utilizes and fosters collaborative use of goods, services, resources and value production through technology (Stephany, 2015).
A factor in the rise of appeal for the sharing economy stems from ecological, environmental and societal impacts due to consumerism (Botsman & Rodgers, 2010). Many expect the sharing economy to help lower the ecological impact of consumerism, and it has been a belief that those who participate in the sharing economy do so because of the environmentally friendly factors, as well as economic benefits. However, even though people have positive attitudes regarding the sharing economy, this does not always translate into further action (Hamari et al., 2016). Modern corporations are now taking an old idea and creating a strategic model with the help of technology in order to efficiently use a good or service. Uber, for instance, uses an app to connect drivers for rides instead of traditional taxi service. Similarly, instead of staying at a traditional hotel, Airbnb uses an online platform to foster short-term rentals. Although these platforms aim to maximize the use of under-utilized resources through participating in the sharing economy thus reducing overall ecological and economic burdens, dominating players within the sharing economy industry have put little focus on their sustainability practices (Geissinger et al., 2019). Companies such as Airbnb and Uber provide open access through a peer-to-peer marketplace; their platforms are built on the trust of users, which are subject to legal, ethical and social dilemmas. Trust is a core component when collaborating or operating in the sharing economy, and companies such as Uber and Airbnb face tough challenges around trust. In 2019, Uber released the company's much-anticipated safety report, stated that 99% of the rides went without incident even though the same report counted 5,981 cases of sexual assault in the previous year (Garcia & O'Brien, 2019). Similarly, in Edmonton, Alta, several legal issues have arisen due to stabbings and shootings in open-invite parties held in Airbnb’s short-term rental properties, which the company has now banned (Wyton, 2019). These occurrences often cause social, legal, and policy dilemmas that need to be addressed to improve trust among people.

3. Sustainability of the sharing economy

To explore what sustainable sharing economy is, several different approaches can be used. One of them is to view a business innovation through a three-pillar model. The three-pillar model, also known as the triple bottom line model, is an extension to view businesses through a more sustainable lens in comparison to the traditional for-profit only view (Mulligan, 2014). It includes the three interacting elements of economic, environmental, and social impacts of a business.

Figure 1: Three-Pillar Model of Sustainability



Source: Mulligan, 2014

The three-pillar model is a common academic model used to systematically think about the overall practices of a business by compartmentalizing its practices under the appropriate pillar. The model can then provide an overview of practices regarding sustainability. For example, the economic impacts of a business can be quantified in terms of its financial profitability, its productivity, and the level of employment it generates. However, in the process of creating goods and services, the business also utilizes valuable natural resources and produces pollution that can be viewed as its environmental impact. Similarly, the business also has a significant social impact through its engagement with local and global community, work conditions it creates for its employees, and the regulatory and ethical principles it follows. A strong intersection of the economic, environmental, and social elements determines how sustainable the business is in its interactions with the society (figure 1).

4. Case of E-scooters in Edmonton

E-scooters represent the most recent wave in the sharing economy by supporting reduction in congestion and pollution in major metropolitan areas. The e-scooter companies aim to take hold of the short distance ride sharing market, and although they may have an innovative business model, the companies may not be disrupting the market as other sharing economy companies have (Sadler, 2019). Lime and Bird are two examples of companies that are currently operating e-scooters across Canadian cities (see figure 2).

Figure 2: Lime E-Scooters Parked Outside MacEwan University, Edmonton

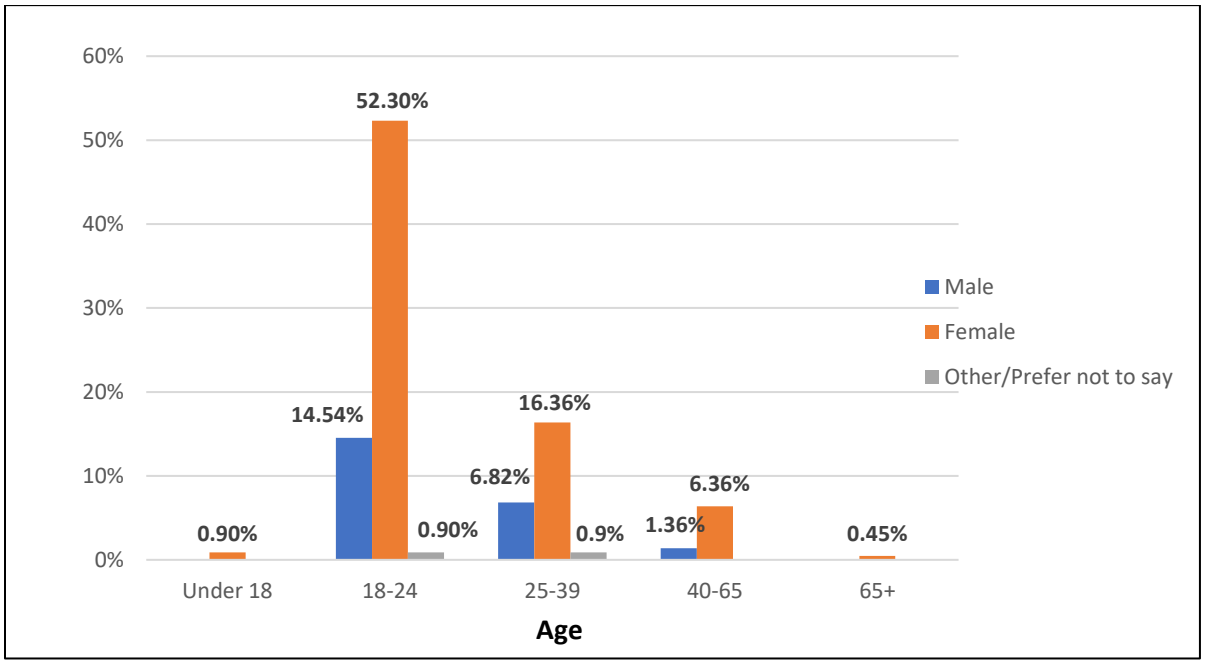
Photo credit: Author(s)

These scooters were first introduced in Edmonton during the summer of 2019 and are expected to be reintroduced in 2020. They can be rented via an app that features a GPS map of available scooters within rideable zones, as determined by the company. Unique QR codes on the scooters can be scanned to 'unlock' rides for CA$1.00, and riders are charged $0.30 per minute until they relock scooters by ending their ride on the app (https://www.lime/en-us/home). The scooters are collected nightly by contracted people known as "Juicers" who recharge and redistribute them for use the next day. To understand the sustainability elements of e-scooter use in Edmonton, we collected data from multiple sources and analyzed it using the three-pillar model. Our data included an interview with a senior executive of Lime Scooter Company and a survey on scooter use with 222 people across Edmonton. We also carried out a literature review as well as a search of mainstream media to obtain information on economic and environmental aspects of e-scooters.

4a. Brief description of the Data and Methods

Primary data was collected through a phone-interview with a Lime Scooter company executive, which provided the quote featured below. An online survey was also conducted among a Facebook group that includes mostly students and staff of MacEwan University, to collect opinions and viewpoints regarding use of e-scooters in the Edmonton area. Overall, 222 responses were collected for the e-scooter survey (see appendix for details). Approximately 75.7% of respondents were female, 22.5% male, and 1.9% listing other/prefer not to say (figure 3). 52.3% of the respondents were in 18-24 age bracket followed by 16.36% in the 25-39 age group.

Figure 3: Age Distribution of Survey Respondents by Gender (n=222)



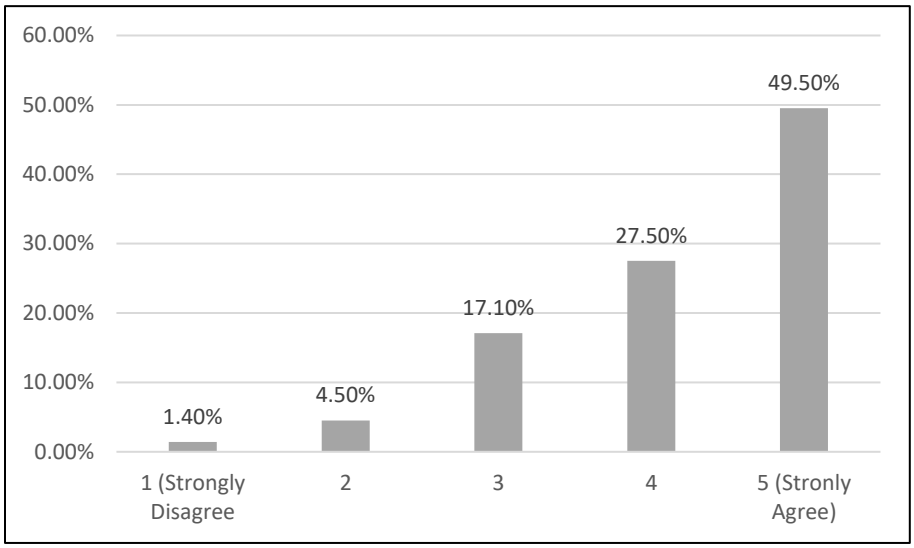
4b. Main Findings

Lime e-scooters were first introduced in the Edmonton area in the summer of 2019 (Antoneshyn, 2020). Lime conveys a strong focus on sustainability in its business practices; while a majority of Edmontonians in our online survey agree with this claim, we carried out a more comprehensive investigation by exploring the environmental, economic, and social sustainability impacts and benefits introduced by electric scooters.

Environmental: Our survey had an explicit question on perceived environmental impacts of e-scooters—"E-scooters are an environmentally friendly mode of transportation." Subjects could choose one of five responses that were organized as per Likert scale with 1 being strongly disagree, to 5 being strongly agree (figure 4). 49.5% of our respondents strongly agreed with

the statement while only 1.4% strongly disagreed. A further 44.6% of the respondents were moderately to highly in agreement. Even though our survey respondents do not fully represent the general population, we can infer from these results that most people perceive e-scooters to be environmentally friendly mode of transportation. This is based on them being battery operated and not burning any fuel.

Figure 4: Survey Responses: "E-Scooters are environmentally friendly" (n=222)

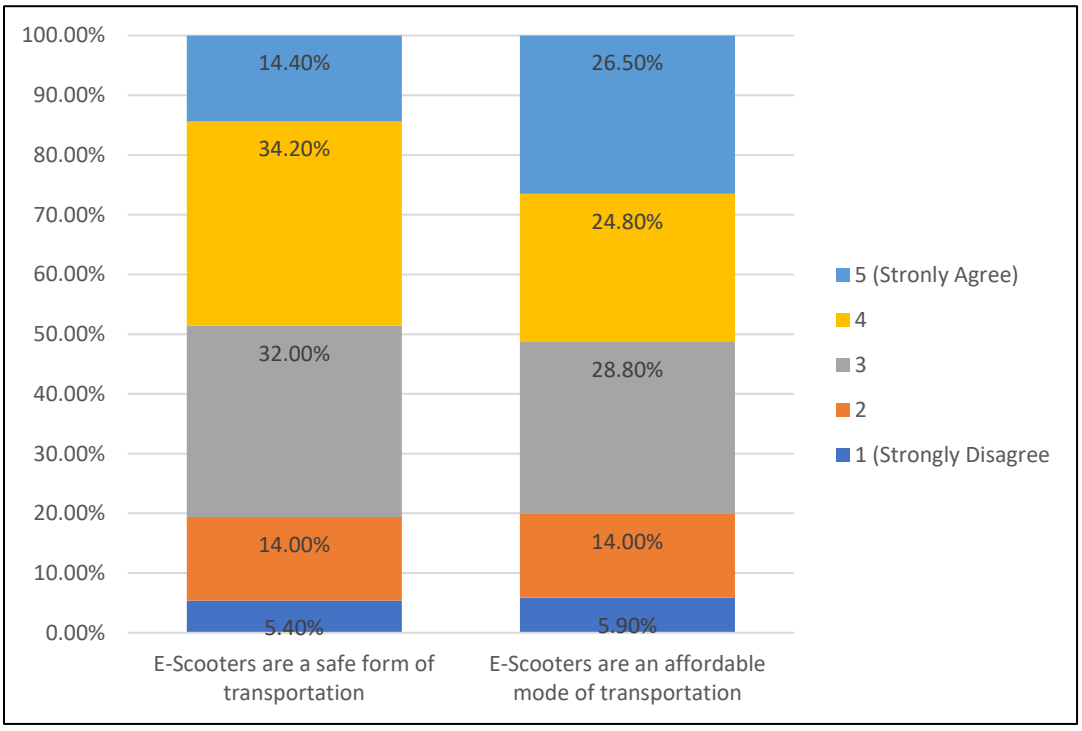


Interestingly, a life cycle analysis of e-scooters indicates that they are not as environmentally friendly as commonly believed. For example, Hollingsworth et al (2019) reveal high emissions primarily associated with manufacturing of e-scooters, and their collection and distribution via gas run vehicles. Manufacturing accounts for 50% of e-scooters' overall emissions, most of which come from manufacturing its lithium-ion battery and the aluminum frame. While manufacturing and material emissions are mostly unavoidable, extended e-scooter lifespans can reduce total emissions. However, average scooter lifespans are currently not agreed upon, with some studies putting it at as little as 28 days (Griswold, 2019), while others pointing out a wide range of lifespans ranging from 6 months to a maximum of 2 years (Hollingsworth et al, 2019). Either way, the results are not convincing: the short life expectancy drastically increases overall emissions due to a higher need for replacing scooters by manufacturing new ones. Collection and distribution methods nearly double per-scooter emissions, contributing to 43% of the total emissions. These emissions are almost entirely due to long trips made with gas powered vehicles to collect e-scooters and recharge their batteries, sometimes even when the batteries are only partially depleted. Hollingsworth et al (2019) show significant emission reductions with restricted travel distances. Nonetheless, in terms of environmental impact, we can state that while operation of e-scooters is perceived as environmentally friendly, their manufacturing and distribution has significant impact on the environment. With improvements in technology and longer battery times, these impacts are expected to subside, especially if Lime and other scooter operators can come up with better ways of collecting them for recharging.

Economic: When conducting economic analysis of e-scooters, we focused on two main aspects: (i) the economic or financial profitability for e-scooter companies, and (ii) affordability for users. In terms of financial profitability, e-scooters are still in an early stage of development. Even though Lime has been classified as a 'tech-unicorn', it has lost $300 million this year, despite $420 million in revenue (Weinberg, 2019). An independent study by Ark Invest (Korus, 2019) revealed that Bird, a Lime scooter competitor, is losing $0.12 per mile per scooter based on the company's current expenses. Per-minute pricing is even higher in Edmonton than what is reported in this study ($0.35 in Edmonton compared to approximately $0.20 per minute quoted in the study). This is likely due to scooter seasons being limited by long, un-rideable winters in Edmonton. While the current economic outlook is not ideal, Ark Invest predicts that costs could decrease from current $2.43 per mile to $0.53 per mile as manufacturing costs decrease and e-scooter companies lower costs internally through economies of scale and brand development.

Further, with COVID-19 looming, Lime and other tech-unicorns within the sharing economy could be facing bankruptcy (The Economist, 2020). With this loss comes the threat of ride price increases to stay afloat. Currently, 26.5% of our respondents strongly agree that e-scooters are affordable to use while only 5.9% strongly disagree. An additional 24.8% of respondents agree with the statement. This implies that more than half of our respondents find e-scooters affordable to rent and use (figure 5). These numbers could of course change if Lime is forced to increase its prices to improve its profitability.

Figure 5: Affordability and safe use of e-scooters (n=222)

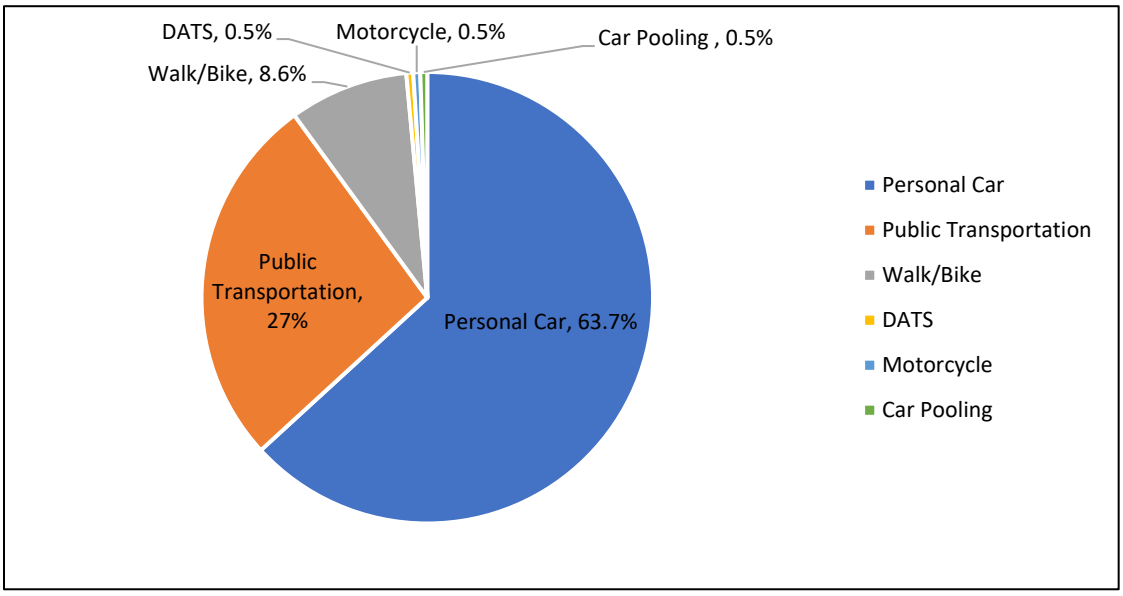


Social: The social elements of sustainability indicate the level of engagement between the company and its target community. Senior Director of Strategic Development with Lime Canada provided a quote that encompasses Lime's business model and link to social sustainability:

> Lime is the world's leading smart mobility provider serving over 130 cities globally in over 30 countries across five continents, empowering riders with affordable, flexible, and sustainable shared transportation options. We focus on life within cities by shifting from the status quo (congestion, pollution, isolation, and inequality) to a world of possibility through the wonder of mobility.

Currently, 63.7% of our respondents use personal cars as their main mode of transportation while only 27% rely on public transportation (figure 6). Further, 58% of our respondents had used e-scooters, while 42% had not. Additional thoughts and opinions from the survey resulted in concerns regarding riders not following city bylaws. For example, the City of Edmonton requires riders to use the road or bike lanes within the city that have a speed limit of 50km/h or less (https://www.edmonton.ca/transportation/cycling_walking/bike-electric-scooter-sharing.aspx). However, riders are often seen riding on the sidewalks instead of following city bylaws. Despite sidewalk rules being ignored, 49% of survey respondents still agree that e-scooters are a safe mode of transportation, with 14.4% of respondents strongly agreeing to the statement that e-scooters are a safe mode of transportation (figure 5).

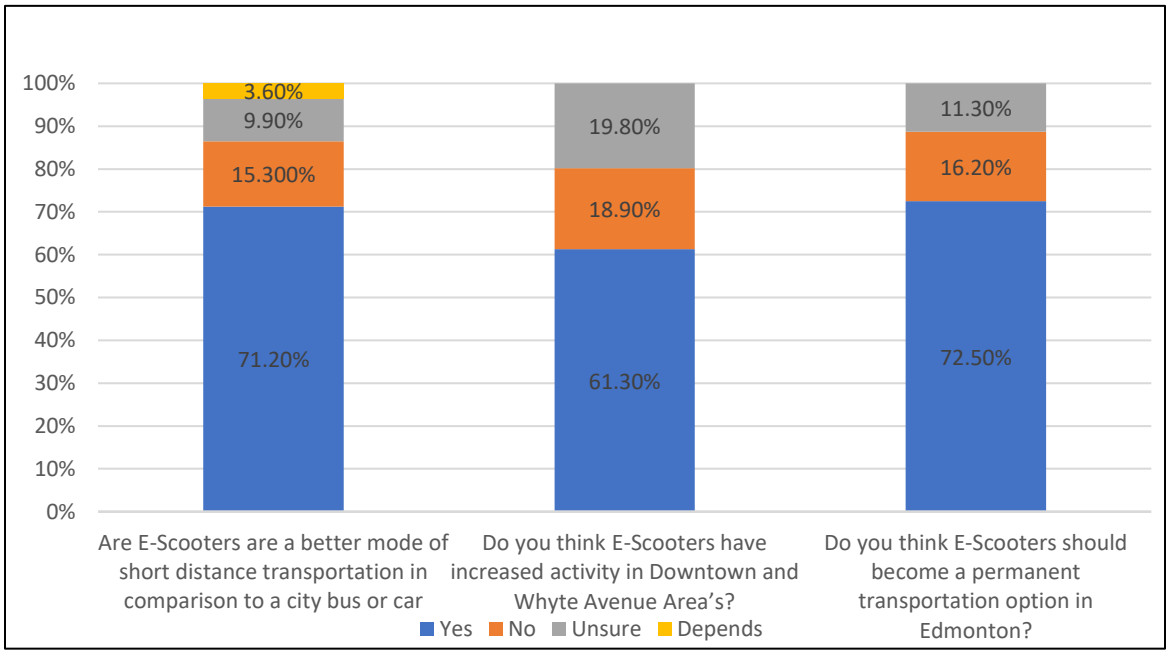
Figure 6: Main modes of transportation in Edmonton (n=222)



The survey also suggests that 61.3% of respondents think e-scooters have a positive impact on economic and social hubs within the city by increasing activity in the downtown core and around Whyte Avenue. Further, 71.2% of survey respondents believe that e-scooters are a better mode of short distance transportation than bus or car, and 72.5% stated that e-scooters should become a permanent transportation option in Edmonton (figure 7).

Due to the concerns around how users are riding e-scooters, the survey responses also expressed the desire for additional education around e-scooter use within Edmonton. Another social concern within e-scooter operations is the amount of user trust needed to operate successfully. Users are trusted to handle scooters with care and park them in areas that follow city guidelines. This has been an issue in Edmonton already—scooters are occasionally left in the middle of sidewalks and on roads, and there have even been reports of e-scooters being set on fire with blowtorches (Wong, 2019).

Figure 7: Survey responses on economic aspects of e-scooters (n=222)

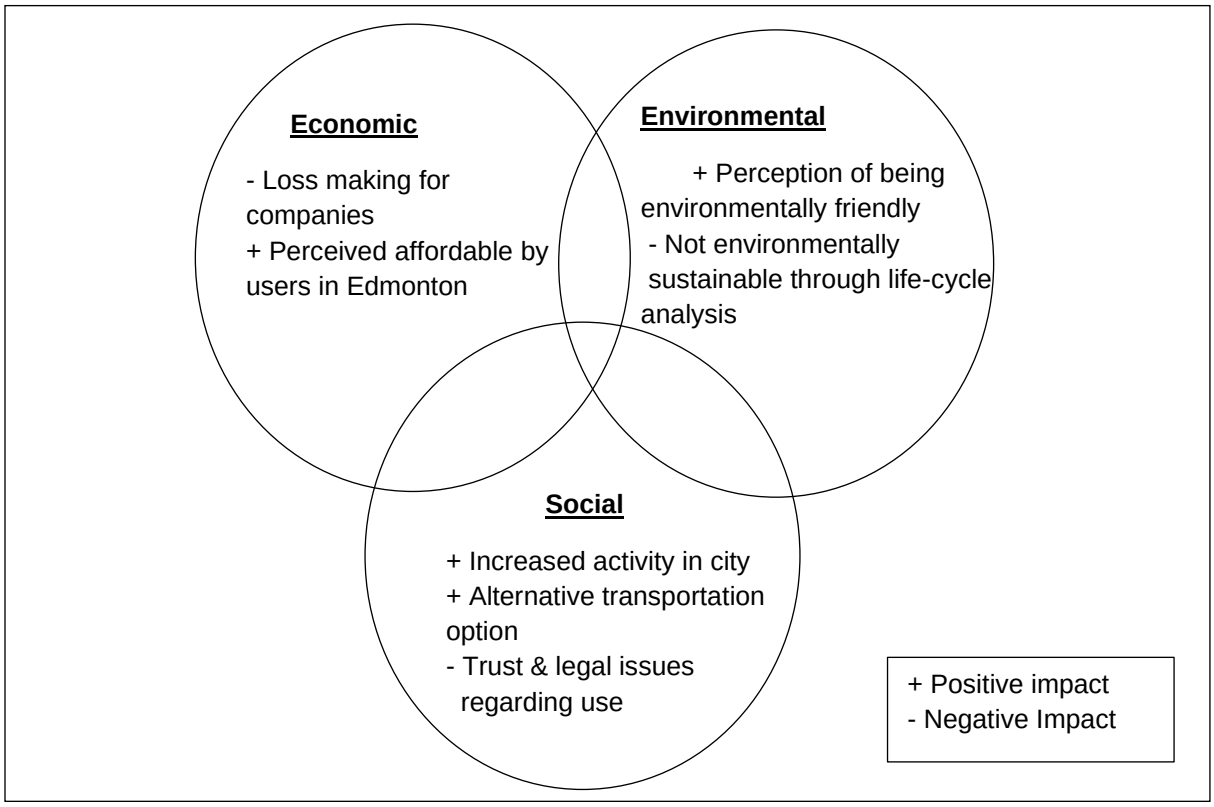


4c. Summarizing Sustainability of e-scooters using the 3 Pillar Model

E-scooters are a prime example of modern sharing economy so much so that Lime, the company that operates them in Edmonton has been classified as a tech-unicorn (The Economist, 2020). The general perception among the users is that e-scooters promote sustainability, which is in line with the company's stated goal. As we discuss above, the three-pillar model (Mulligan, 2014) is extremely helpful in exploring the sustainability aspects of e-scooter use in Edmonton through the three interacting elements of economic, social, and environmental elements. In terms of economic impact, even though Edmontonians currently believe that e-scooters are affordable, operating these scooters is a loss-making enterprise. The financial profitability could further worsen due to travel restrictions in place to fight the Covid-19 pandemic. The environmental impact is also mixed with most users perceiving battery operated scooters to be environmentally friendly even though a life cycle analysis reveals significant emissions associated with manufacturing and distribution of these scooters. Finally, the social elements for Edmonton include positive impact of increased activity in several parts of the city, and availability of a safe and alternative mode of transportation. However, with many riders not

honoring by-laws regarding e-scooter use, they cause nuisance to pedestrians who also use the sidewalks (figure 9). This is not a trivial issue: several European cities restricted the use of e-scooters in 2019 as the riders were frequently bumping into pedestrians!

Figure 9: Sustainability of e-scooters in Edmonton



5. Conclusion

The modern sharing economy, while having roots in sustainable practices, can often be mistaken as an inherently sustainable business model. Online platforms make resource sharing between peers easier to access but have also proven not always to be currently economically sustainable, as was discovered in the Lime e-scooter case study. Based on our research, we can state that contrary to common perceptions, environmental sustainability of e-scooters is also not ingrained in practice, and careful consideration of business operations is needed to mitigate potentially negative impacts. In addition, thoughtful policies need to be considered and put into place in order to encourage public and private trust. Overall, the sharing economy can be quite effective in creating a sense of community and social sustainability, but it should not be written off as wholly sustainable without evidence.

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Appendix: Edmonton E-Scooter Survey Questions

Conducted by: Authors
Survey information: This survey was conducted across October 2019-December 2019.
Purpose: To gain opinion and perceptions around E-Scooters within Edmonton, Alberta, Canada.
Sample: n = 222

Questions

Demographic Questions

What is your age?

- Under 18
- 18-24
- 25-39
- 40-65
- 65+

2) What is your gender?

- Female
- Male
- Prefer not to say
- Nonbinary

3) Have you used E-Scooters in Edmonton before?

- Yes
- No

4) What is your main mode of transportation?

- Personal Car
- Public Transportation
- Walk/Bike
- DATS
- Motorcycle
- Car Pooling (Pogo)
- Taxi
- Ride-Share (Uber/Lyft)
- Other

E-Scooter Usage/Perception Questions

Likert Scale Index:
5= Strongly Agree
1= Strongly Disagree

5) E-Scooters are a safe form of transportation.

6) E-Scooters are an affordable mode of transportation.

7) E-Scooters are an environmentally friendly mode of transportation.

8) Are E-Scooters a better mode of short distance transportation in comparison to a city bus or car?

- Yes
- Unsure
- No
- Depends

9) Do you think E-Scooters have increased activity in the Downtown and Whyte Avenue Area?

- Yes
- Unsure
- No

10) Do you think E-Scooters should become a permanent transportation option in Edmonton?

- Yes
- No
- Unsure