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# An Investigation of Sustainable Self-Drive Tourism in Florida

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## Abstract

Self-drive tourism is popular in Florida and an under-researched academic area. Given electric vehicle sales grew significantly in the last few years, this paper investigated how electric cars could impact drive tourism in Florida. For self-drive tourists the quality of facilities and destinations drive satisfaction. Yet, supply side limitations can hinder an innovation's adoption and diffusion. Investigating the availability of electric rental vehicles and necessary charging times while travelling between tourism destinations in Florida showed a limited availability of electric cars through established car rental companies. Turo, an example of a person-to-person car sharing service, had several electric cars on offer. Yet, charging facilities for electric vehicle renters and charging times between tourism destinations seem to be within acceptable thresholds. This limited supply of EVs could slow down the EV adoption for self-drive tourism. Given the infancy of the electric vehicle market, factors driving electric vehicle self-drive tourism will change significantly over time and tourist behaviour related to this new drive trend seems an interesting and growing research avenue.

## Introduction

Travel and tourism industries are among the largest export industries and employers in the US. Florida is ranked second among US states in attracting tourists (Chelangat 2018). Around 10.8 million international tourists visited Florida in 2018. The biggest group of international visitors, around 3.5 million, came from Canada. With an average length of stay at 21.2 days, Canadians stayed longer than any other visitors in Florida, making Canadian tourists an important target market for Florida tourism (Visit Florida n.d.).

Renting a car is a popular form of travelling among tourists in the US and also in Florida (Satchell 2015). Consequently VisitFlorida (www.visitflorida.com) mentions 'Road trips' as a travel idea on their website and USA Today highlights the approximately 170-mile drive from Miami to Key West as one of the most beautiful in the country (Mohrman 2017).

Despite its growing popularity and differences to other tourism types, drive tourism has received limited attention in the academic literature and researchers call for ongoing research in the field (Fjelstul and Fyall 2015; Prideaux and Carson 2003). For example, unstable and high energy costs are one of the current and longer-term threats to travel and tourism in the US (Fjelstul 2014). One solution to this threat could be a broader adoption of electric vehicles (EVs). EVs offer several advantages over conventional vehicles, e.g. low operating costs and emissions (Electric Vehicle Council 2019). Consequently, EV sales grew by over 50% worldwide from January to April 2019 compared to the same months in 2018 (Loveday 2019a). Yet, EV popularity seems to differ significantly between Florida and its major tourism target market Canada. In 2018 EVs had a market share of about 1 percent in Florida, 1.96 percent in the whole US and 2.2 percent in Canada (Electric Mobility Canada 2019; EVAdoption 2019). California leads the ranking in the US with 7.84 percent adoption (EVAdoption 2019). This study investigates whether Florida is prepared for EV self-drive tourism.

## Literature Review

### *Drive Tourism*

Drive tourism is defined as travelling from one point to a destination and engaging in tourism activities during the journey. Some authors include a time element and emphasize that the journey must include at least one night away from home and could be for a holiday or visiting friends (Olsen 2002). An advantage of drive tourism over package tours is its individuality and flexibility. Drive tourists can change their itineraries, for example shorten or extend a stay at an interesting destination (Prideaux and Carson 2003). Whilst drive tourism includes different modes of transport such as train, bus and car, self-drive tourism as a subset of drive tourism is using a private, rented or borrowed car as the primary mode of transport (Scott 2002).

Self-drive tourism is the most popular transport form for visitors to most countries including the US (Prideaux and Carson 2003). Self-drive tourism provides opportunities to reduce stress, embrace individuality, and enjoy a sense of freedom or independence. It usually involves various destinations. Therefore, self-drive tourists satisfied with a self-drive trip may not be loyal as they prefer a variety of experiences (Prideaux and Carson 2010). Yet, satisfaction translates into word of mouth which attracts new self-drive tourists. The destination and a destination's facilities are the main drivers of self-driving tourists' satisfaction (Qiu, Hsu, and Shu 2018).

Demand for drive tourism is subject to decision criteria including price, time, infrastructure and destination. Vehicle type and infrastructure must be compatible to travellers' demands (Fjelstul and Fyall 2015). Consequently, appropriate rental vehicles and infrastructure must be supplied to meet travellers' demands. Electric vehicles might be a growing rental option in the 'Sunshine State' Florida.

## Electric vehicles

Electric vehicles (EVs) are fully or partially powered by electric motors. EVs include BEVs (battery electric vehicles), PHEVs (plug-in hybrid electric vehicles) and HEVs (hybrid electric vehicles). Whilst BEVs use electricity as the car's sole energy source, PHEVs and HEVs have a conventional gasoline engine and an electric motor, giving the driver high flexibility as they can use gasoline and electricity to power the car. However, this flexibility comes at a price as PHEVs and HEVs have to carry around a gasoline engine, gasoline and a battery pack, adding weight to the car. This added weight leads to a less efficient gasoline engine than a conventional gasoline car and to a lower battery range than a BEV (Fjelstul and Fyall 2015). Another difference between BEVs, PHEVs and HEVs is that only the first two can be charged from the grid, HEVs' electric energy comes entirely from regenerative braking (CAA National 2019; Ploetz et al. 2014). HEVs are therefore most similar to gasoline cars. BEVs are most different from conventional cars.

EVs have several advantages over conventional gasoline and diesel engine vehicles. Gasoline and diesel engine vehicles are major sources of greenhouse

gases and other air pollutants (Fjelstul and Fyall 2015). Burning fossil fuel for transportation accounted for most greenhouse gas emissions, 29 percent, in the US in 2017 (EPA 2019). EVs emit less emissions that impact air quality and public health. Research showed a reduction of almost US$ 2,500 in health costs over a ten year period for each conventional car replaced with an EV (Electric Vehicle Council 2019).

Yet, EV manufacturers have limited options to charge EV buyers for the societal benefit of air quality improvement. This economic handicap disincentivises eco-innovations like EVs (Sierzchula et al. 2014). Without stimulation of external factors such as government subsidies, emission regulations or increasing fuel prices, EV adoption is limited (Sierzchula et al. 2014). Some countries therefore offer tax credits and other incentives to encourage EV adoption. For example the US offers a tax credit of up to $7,500 and Canada offers up to $5,000 to EV buyers (Office of Energy Efficiency & Renewable Energy n.d.; Transport Canada 2019).

Some cities have started emissions regulations such as limiting inner-city traffic to low emission vehicles. For example, old diesel cars are not allowed in Paris since July 2017. Paris plans to further tighten regulations to allow only EVs and hydrogen fuelled cars on its roads by 2030. Another 19 cities worldwide have similar plans in place (Carriat 2018; Deloitte 2019; Garfield 2017). Furthermore EVs help reducing a country's oil dependence which should enhance the economy and energy security of the USA (Fjelstul and Fyall 2015; Palmer et al. 2018).

Compared to gasoline and diesel engines, electric motors also have several technical advantages. Electric engines have fewer moving parts and less fluids but deliver high torque even at low motor rotation frequency with short reaction times. For EV drivers these technical attributes translate into dynamic driving with high acceleration and low maintenance costs (Office of Energy Efficiency & Renewable Energy n.d.; Ploetz et al. 2014). Furthermore, comparing fuel and electricity costs, EVs' are less than half of conventional cars' operating costs in Florida. For example, on July 20th, 2019 a gallon of gas in Florida was on average $2.58 while the comparable amount of electricity was $1.08 (Office of Energy Efficiency & Renewable Energy 2019). Recharging a BEV using solar panels can reduce a BEV's operating costs even further.

Consequently, EVs offer a wide range of benefits for consumers as well as self-drive tourists – performance, cutting-edge technology, full city access, and lower running costs (Deloitte 2019; Garfield 2017). With oil prices significantly rising and prices for solar panels and batteries significantly falling over the last few years, EVs have become a viable alternative to gasoline and diesel fuelled vehicles (Ploetz et al. 2014; Richter 2019; Statista 2019b; 2019a). Tesla's models 3, X and S, Chevrolet's Bolt and Nissan's Leaf are the five most sold BEVs and among the seven most sold EVs in the US in 2019 so far (Loveday 2019b). Whereas the Nissan Leaf has a range of 150 miles, Chevrolet's Bolt offers 238 miles and Tesla's models over 300 miles range (Ulrich 2018; Tesla 2019a; Halvorson 2019).

## Limitations of Electric Vehicles

At the moment four important customer concerns hinder EV adoption – a high purchase price of EVs, a limited electric driving range, a lack of charging infrastructure and the time to recharge a battery (Deloitte 2019; Sierzchula et al. 2014).

EV purchase prices depend heavily on battery costs and therefore are significantly more expensive than their gasoline or diesel engine counterparts. An increase in the size of its battery raises an EV's driving range but also its purchase price. Therefore, EV manufacturers need to balance the driving range aspect with a vehicle's purchase price. Despite lower EV operation costs, consumers seem to focus less on the total cost of ownership when making a purchase decision and overemphasize the high purchase price of EVs (Sierzchula et al. 2014). One explanation could be the present bias most consumers have – preferring an immediate gratification of lower purchase prices for traditional cars to a possibly greater future benefit of lower EV operation costs (Bazerman, Tenbrunsel, & Wade-Benzoni, 1998; Oster & Morton, 2005).

Yet, the EV market is still in an early phase, so further technological developments will inhibit the mentioned EV adoption concerns in the near future (Ploetz et al. 2014). For example, eight BEV models recently introduced on the market have a driving range exceeding 200 miles and car

manufacturers plan to introduce models with ranges from 300 miles and up to 600 miles in 2019 and 2020. New battery technology will result in further EV range increases over time (Deloitte 2019; Gorzelany 2019).

Similarly, technology development and economies of scale will continue to decrease EV prices and the cost of ownership should be on par with conventional vehicles by 2022 initiating a rapid growth of EVs' market share (Deloitte 2019). The increasing range of EVs and technology improvement in charging speeds will also reduce the other two adoption concerns as EV drivers need to charge their cars less frequently and in less time than previously (Deloitte 2019).

### *Charging Infrastructure*

Similar to gasoline cars, EVs need a charging infrastructure to "refill" the car. So, the charging infrastructure is the primary facility for EV travelling and self-drive tourism. One EV advantage is charging from the existing grid, for example overnight at home or at the office, however, at a slower rate than at a dedicated charging station. The time to add 100 miles of range varies from 26 hours for the slowest to six minutes for the fastest charging option (Lee and Clark 2018). Tesla's recently introduced V3 superchargers can charge a BEV with a charge for 75 miles in 5 minutes (Tesla 2019b).

At the moment the majority of EV users accepts charging times of up to 2 hours (Investor's Business Daily 2019). Yet, waiting time has a negative impact on perceived service quality and customer satisfaction. For example, perceived waiting time and the waiting environment had a significant impact of tourists' satisfaction in a theme park. An appealing waiting environment reduces the negative effect of waiting time on satisfaction (Li 2010). Therefore, tourist satisfaction could increase when a pleasant experience outweighs the inconvenience of a necessary EV charging stop. Yet, an increase in EVs in the future will require an increasing number of charging stations otherwise waiting times at charging stations might increase further.

Research suggests a positive and significant relationship between charging stations and EV adoption rates (Sierzchula et al. 2014). There were 75,430

charging outlets in the US in August 2019. Charging outlets in Florida almost doubled within the last year from 2,041 in 2018 to 3,914 in August 2019 with multiple charging options in most cities and along Florida's coastlines (fleetcarma 2018; U.S. Department of Energy 2019; n.d.).

For tourism organisations, providing charging facilities to customers can be a competitive advantage. For example Hilton doubled its hotels with charging facilities in the US from 50 to 100 in 2016 and again in 2017 to 194 properties (Kane 2015; Lambert 2017).

With BEV ranges of up to 370 miles at the moment and 38,000 electric vehicles registered in Florida, Florida's charging infrastructure seems sufficient for most trips (Drive Electric Florida n.d.; Kane 2019). Yet, drivers of EVs with low battery ranges might have to take these limitations into account when travelling.

In the future EV drivers can expect a further increase of charging stations in Florida. For example, Duke Energy, an electric power company in Florida, plans to add another 530 charging stations (Manthey 2018). According to Governor DeSantis, Florida plans to have fast charging stations at all major highways for the same level of convenience as gas stations (Lemongello 2019). USA Today and Tesla showed that there are enough charging options on five popular long-distance routes across the country (Abramson 2018). Given the EV market is in its infancy, it is important to understand the profile of EV users who are potential EV drive tourists in Florida.

## Electric Vehicle Users

Electric vehicle users are also tourists on holidays. It is therefore important to understand why consumers become EV users and how this could impact their tourist behaviour.

Economic and psychological reasons help explain why consumers engage in pro-environmental behaviour. Consumers maximise their utility, so personal gains motivate consumers. When benefits of buying environmental products outweigh their costs, consumers are more likely to buy these products. Consequently, studies focusing on consumers' value maximisation

found that financial attributes of EVs are important. Purchase price had a significant negative influence on EV utility, at least for people with lower or medium incomes. People with high incomes were less price sensitive. Operation costs, maintenance and energy costs, are an important advantage of EVs over conventional vehicles (Liao, Molin, and van Wee 2017).

Yet, the type of EV might be important as BEVs are a more radical technological departure from conventional vehicles than hybrid vehicles resulting in higher consumer uncertainty. The more an innovation differs from the conventional technology, the less consumers are willing to pay for it (Sierzchula et al. 2014). Consequently, consumers face a higher uncertainty when thinking about BEV adoption and might be willing to pay less for a BEV compared to PHEVs or HEVs.

Technical attributes such as driving range, recharging time and charging station density are other factors influencing EV adoption with short driving ranges considered to be the biggest barrier in EV adoption (Liao, Molin, and van Wee 2017). Yet, with an annual growth rate of over 20% to over 70,000 charging stations in the US and battery ranges of new EV models exceeding 300 miles, the fear of running out of electricity diminishes (EVAdoption n.d.; Gorzelany 2019).

Psychological reasons for adopting EVs include an individual's perception of moral correctness and incorrectness. Consumers buy green when they believe that purchasing sustainable products should be done. Hedonic motivations are other reasons for the increase in sustainable products. Sustainable consumption can improve one's feeling, lead to feelings of pleasure and excitement and therefore increase the probability of a green purchase (Rezvani, Jansson, and Bengtsson 2018). The Diffusion of Innovations theory helps profiling adopters of an innovation such as EVs.

## Diffusion of Innovations Theory

An innovation is subjective and depends on the perception of an individual, group or organisation (Rogers, 2003). Researchers use the Diffusion of Innovations theory (DOI) to study innovation diffusion amongst

individuals and organisations (Rogers, 2003). DOI distinguishes several groups of innovation adopters (see Figure 1), with 'innovators' being two and a half percent and 'early adopters' 13.5 percent of all adopters. The early majority, late majority and laggards are 84 percent of the population.

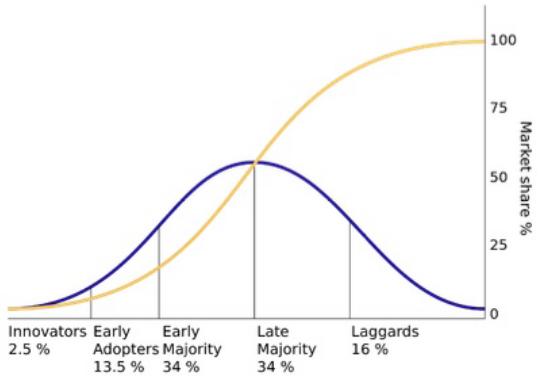


Figure 1. Groups of Innovation Adopters (Rogers 2003)

Innovators and early adopters are decisive for the successful introduction of a new technology in a market as they influence following groups (Ploetz et al. 2014; Rogers 2003). Innovators are venturesome risk-takers serving as gatekeepers for the following groups. Early Adopters are opinion leaders. They are the first ones to evaluate and adopt an innovation and therefore receive social esteem. Members of the Early Majority group are happy to adopt an innovation after others have evaluated it. Late Majority members are sceptical and wait until most others have evaluated an innovation. Laggards base their expectations on the past rather than the future and are last to adopt an innovation (Brown and Venkatesh 2003; Rogers 2003).

Consequently, an innovation's market share increases slowly until innovators and early adopters have evaluated and adopted an innovation. Innovator and early adopter individuals, novelty seekers and price insensitive, are motivated to adopt a new product or idea earlier than others (Dedehayir et al. 2017). The adoption through early and late majority members increases the market share's growth of an innovation significantly. Innovators and early adopters buying EVs help EV adoption in generating a threshold effect, more people buy an EV after they have seen them on the road (Eppstein et al.

2011; Sierzchula et al. 2014). Furthermore, innovators and early adopters are opinion leaders. Their role is to communicate the innovation's benefits to the remainder of the population. Yet, innovator characteristics vary per product category. For example, characteristics of fashion innovators differ from IT innovators (Dedehayir et al. 2017).

Research in the UK from 2011 showed early adopters of EVs to be male with an above average income. In line with the general description of innovators and early adopters they were less risk-averse than the general population. For example, low range anxiety, openness to new technology, a social environment which is EV friendly and a high willingness to pay were main characteristics of UK early EV adopters. A US study found PHEV adopters to be wealthy, the environment is important to them and they are happy to express their values through their car. Environmental attitude was the strongest predictor for purchase likelihood, demographics and vehicle characteristics were less important. Yet, another US study found economic advantages were more important than environmental considerations (Ploetz et al. 2014).

Therefore, Canadian tourists in Florida having a fairly high average income should be interested to rent EVs (OECD, n.d.). Yet, despite market demand encouraging car manufacturers to introduce EVs to the market, the onus is on the tourism supply sector to understand forces at play and to be ready for a green market (Fjelstul and Fyall 2015). Supply restrictions hinder diffusion and result in a slow growth rate (Jain, Mahajan, and Muller 1991).

In summary, Florida is an attractive destination for self-drive tourists. Canadian tourists stayed the longest in Florida, making them an attractive target market for tourism organisations in Florida. Tourists with an innovator or early adopter profile are even more valuable for tourism organisations than the general public as they have an above average income. Therefore, tourism organisations in Florida should meet Canadian self-drive tourist demands to satisfy them and encourage them to give word of mouth, attracting additional self-drive tourists. EVs seem an interesting alternative to conventional gasoline cars as they offer lower running costs and other advantages. Given the advantages of an EV, current EV users might want to rent an EV during their holidays in Florida. Also given the increase in EV

sales and the threshold effect of seeing more and more EVs on the streets, current non-EV users might be interested to try an EV when renting a car during their holidays. Yet, car rental companies with limited EV options and a lack of infrastructure could hinder the adoption of green self-drive tourism options in Florida. This study therefore investigates if tourists can rent an EV in Florida and if they could drive an EV to the major tourist attractions to ensure they are satisfied with their holidays, generating positive word of mouth.

## Methodology

Rental car companies are important for international tourist coming to Florida for a self-driving holiday, for example during Christmas holidays (23rd December 2019 – 3rd January 2020) and the Mid-winter break (16th – 22nd March 2020) in Canada (Edarabia n.d.). Given the importance of Canadian tourists for Florida tourism, this paper investigates the online booking availability of EVs at Florida's three major airports Orlando International, Miami International and Fort Lauderdale-Hollywood International from the four major car rental companies in the US, Enterprise Holdings, Hertz, Avis and Dollar during the mentioned Canadian holidays (Lock 2019; Maxfield 2012; Federal Aviation Administration 2019). Furthermore Turo, an example of a person-to-person car-sharing service, is an alternative to established rental companies. It operates in 4,700 cities in the US, Canada and in the UK (Jacobs 2018). Consequently, renting Turo cars close to the three major airports could be another option for tourists coming to Florida.

The research also uses abetterrouteplanner.com, an example of websites specialising in EV trip calculations, to investigate if tourists could visit Florida's top five tourist attractions – Disney World, Miami, Key West, The Everglades and St Augustine (Lonely Planet 2018) – without charging times exceeding the mentioned threshold of 2h. Both factors, vehicle availability and specific infrastructure are important pull factors impacting the drive tourism experience (Fjelstul and Fyall 2015). Abetterrouteplanner.com overall seems to be better than most similar products (Gipe 2019).

## Results

**Table 1** shows the availability of BEVs and hybrid vehicles at Florida's major airports from the major car rental companies and Turo on 13. June 2019 for the two upcoming Canadian holiday periods Christmas and Mid-winter break.

| | Orlando International Airport (MCO) | | Miami International Airport (MIA) | | Ft. Lauderdale-Hollywood International Airport (FLL) | |
|---|---|---|---|---|---|---|
| | Christmas Holiday | Mid-winter Break | Christmas Holiday | Mid-winter Break | Christmas Holiday | Mid-winter Break |
| | Number of car categories | | | | | |
| Enterprise | **1** of 23 | **1** of 24 | 0 of 25 | *2* of 30 | 0 of 25 | *2* of 29 |
| Hertz | 0 of 42 | 0 of 42 | 0 of 43 | 0 of 43 | 0 of 40 | 0 of 40 |
| Avis | *1* of 27 | *1* of 29 | *1* of 28 | 0 of 16 | *1* of 29 | *1* of 30 |
| Dollar | 0 of 22 | 0 of 22 | 0 of 20 | 0 of 20 | 0 of 16 | 0 of 16 |

Numbers in **bold** show BEVs; numbers in *italics* show hybrid vehicles

Whilst Turo offered a range of BEV and hybrid vehicle options at all three airports, Enterprise and Avis offer EVs at all three airports; Hertz and Dollar offered only conventional cars. Only Enterprise offered a BEV from the Orlando airport, according to their website a Nissan Leaf or similar.

According to ***abetterrouteplanner.com***, using a Nissan Leaf with a 40kWh battery pack would allow a tourist to drive from Orlando Airport to the top five tourist attractions without major delays for recharging the vehicle. Table 2 shows driving times (including charging times) between the tourist attractions, the necessary duration to recharge a vehicle and the percentage of charging duration of the total travel time. The longest charging time was 44 minutes on the way from Disney World to Miami, still way below the maximum accepted charging threshold of 2 hours. A charging stop of 14 percent of the travel time seems to be acceptable considering that driving in a conventional vehicle needs stops to refill the car, and toilet and meal breaks

as well. Aligning necessary charging stops with 'valuable time' such as meal breaks or visiting a tourist attraction should reduce the inconvenience of these stops for tourists even further.

**Table 2**. Driving times and charging duration between hotspots using a Nissan Leaf with a 40kWh battery pack

| Origin | Destination | Charging duration in minutes | Total travel time in minutes | % charging duration of total time |
|---|---|---|---|---|
| Orlando | St. Augustine | 0 | 141 | 0 |
| St. Augustine | Disney World | 0 | 149 | 0 |
| Disney World | Miami Beach | 44 | 317 | 14 |
| Miami Beach | Everglades National Park | 0 | 68 | 0 |
| Everglades National Park | Key West | 0 | 213 | 0 |
| **TOTALS** | | **44** | **888** | **14%** |

## Discussion

This study confirmed an important limitation of the DOI theory. Restrictions on the supply side can hinder an innovation's diffusion. EVs are significantly different to conventional cars and therefore an innovation in self-drive tourism. Given the advantages of EVs over conventional cars such as the convenience of "refilling" the car at home, lower operation costs and a better performance, EV users coming to Florida as tourists might be interested to rent an EV while on holiday. Non-EV users might be interested to try out an EV while on holiday. As mentioned, destinations and facilities such as the availability of rental cars influences satisfaction of self-drive tourists.

Whilst some tourism organisations such as hotels seem to take advantage of the growing EV numbers in providing charging facilities to their guests, the major car companies had few EVs on offer, only Turo showed a wide range of EVs on offer. Therefore, tourists from Canada who are used to driving an EV at home or are interested to try out an EV during their Florida vacation might be disappointed. Given the EV market is in its infancy and EV users are innovators and early adopters with an above average income, disappointing these tourists with a limited EV availability could nudge them to rearrange their travel plans to California instead of Florida. Furthermore, innovators and early adopters communicate their experiences to the remainder the population, so a lack of innovative vehicle rental options might generate negative word of mouth for Florida as a whole.

Despite fairly low durations for necessary charging stops, tourists still might see these stops as an inconvenience leading to dissatisfaction if facilities at charging stations are not suitable. This highlights a tourism opportunity in making sure there are charging facilities close to tourism hotspots or upgrading charging facilities away from tourism hotspots to make the waiting time there worthwhile. Whilst for example Tesla offers in-car games to play while recharging, charging stations could be developed as tourism hotspots offering not only meal or shopping options but also further guidance for tourists or tourism promotion. Furthermore tourism organisations such as VisitFlorida could promote EVs on their websites.

## Limitations and Future Research

A limitation of this research is the early stage of the EV development. Whereas commercial rental car companies seem to be still hesitant in adopting and offering EVs to customers, this might change when the early and late majority start adopting EVs, highlighting the changed behaviour of a much bigger market share than innovators and only few early adopters at the moment.

Taking the current supply side limitations into account, it would be interesting to investigate tourists' rental behaviour now to see if for example Canadian EV drivers rent a conventional vehicle when an EV is not available

or if they rely on peer-to-peer car sharing options such as Turo.

Similarly, other factors such as EV technology, charging infrastructure and EV numbers will change significantly in the near future. Therefore this research needs to be updated soon and future research could take into account new technologies for example.

Future DOI research could also investigate if EV adoption follows the general DOI pattern or deviates significantly from it as the DOI pattern assumes that the whole population adopts an innovation at some stage. Yet, with alternative transport technologies such as conventional cars, EVs and for example hydrogen fuelled cars offering specific advantages to consumers, it is highly unlikely that one technology replaces others completely.

Another important research avenue is consumer behaviour in regards to charging stops. Given these charging stops are significantly longer than refilling a conventional car, it is interesting to find out how these charging times and charging facilities affect consumer behaviour.

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