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How Do Consumers Become Aware of Electric Vehicles? A Qualitative Approach

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*How Do Consumers Become
Aware of Electric Vehicles?
A Qualitative Approach*

By

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Abstract

Despite electric vehicles accounting for a growing share of new vehicles sales, previous studies have shown that consumers are not substantially engaged in the transition to plug-in electric vehicles (PEVs). Advertising, federal and state purchase incentives, and outreach events such as ride and drives may not be effectively engaging consumers to consider purchasing a PEV. This study seeks to understand how consumers first becoming aware of electric vehicles. We investigate 35 interviews conducted in 2019 with Tesla vehicle owners in California. The results show that word of mouth sources such as friends, family and co-workers are a main way interviewees became aware of Tesla vehicles and electric vehicles. Mass media channels of communication such as news articles, books, and the internet are other important sources interviewees reported. The findings provide insight into the resources used by Tesla owners and the ways they become aware of electric vehicles. Understanding the ways consumers become aware of this technology can assist policymakers and relevant stakeholders in increasing electric vehicle sales and ultimately allow for reductions in greenhouse gas emissions from the transportation sector.

Introduction

With an increase in climate change induced environmental disasters, the need to reduce greenhouse gas emissions (GHG) is paramount. The transportation sector accounts for 29% of the United States' total GHG emissions (EPA, 2019). To reduce GHG emissions, plug-in electric vehicles (PEVs, a nomenclature including battery electric vehicles (BEVs) and plug-in hybrid electric vehicles (PHEV)) have grown in prominence as a viable solution to create a more sustainable transportation sector. Since the mid-2010s, electric vehicles have been growing in success and accounted for almost 7% of new vehicles sales in the U.S. in the first quarter of 2022 (Taylor, 2022). However, to meet ambitious policy mandates such as the Biden Administration's target for 50% of new vehicle sales to be electric or fuel-cell by 2030 (Exec. Order, 2021), and at the state level in California, the Governor's commitment to ensuring 100% of new vehicle sales are electric by 2035 (Exec. Order, 2020), consumer adoption of electric vehicles needs to increase.

Recent research into consumer adoption of light-duty PEVs has found that consumers are not substantially engaged in the transition to PEVs (Hardman et al., 2020). Advertising, federal, and local purchase incentives, and outreach events such as ride and drives are not effectively engaging consumers to consider purchasing a PEV (Hardman et al., 2020). Further, research has shown a lack of growth in the percentage of consumers in California actively considering purchasing a PEV between 2014 and 2019 (Kurani, 2019, 2022). Lack of consumer awareness and engagement with electric vehicles may become a barrier to a successful transition to electric vehicles within California as the market moves beyond early adopters.

This study seeks to find solutions to this barrier by analyzing and understanding how current PEV owners initially became aware of electric vehicles. Specifically, the study analyses Tesla vehicle owners as Tesla currently leads the market share of electric vehicles in the United States. In the U.S., Tesla's Model Y vehicles surpassed all other new electric vehicle sales in 2021 (White, 2022). Thus, analysis of Tesla owners may provide important insight into how to effectively engage with consumers and increase passenger electric vehicle sales.

Our study focuses on Tesla car owners and the main sources that resulted in them becoming aware of Tesla vehicles. Additionally, we determine if Tesla owners were aware of electric vehicles before they became aware of Tesla vehicles or if it was Tesla vehicles that made them aware of electric vehicles. 35 semi-structured interviews conducted with Tesla owners in California were analyzed to answer our study's questions. The analysis of these interviews provides important insight into the main mechanisms resulting in awareness of electric vehicles and Tesla vehicles which can assist in increasing consumer adoption of electric vehicles. This report will first discuss the diffusion of innovation theory and its' application to the awareness of electric vehicles. Then the report will review relevant literature on consumer awareness and engagement with electric vehicles and discuss the qualitative methods used in this research. Lastly, results and important conclusions will be discussed.

1. Diffusion of Innovation Theory

The diffusion of innovation theory explains how an idea or product diffuses and spreads throughout a population or society (Rogers, 1983). The innovation-decisions process is the

process of an individual going from knowledge of an innovation to ultimately either rejecting or implementing the innovation (Rogers, 1983). There are five stages of the innovation process outline below:

- Knowledge: This phase occurs when an individual is exposed to the innovation and gains a preliminary understanding of how it works.
- Persuasion: This phase occurs when an individual formulates a favorable or unfavorable opinion towards the innovation.
- Decision: This phase occurs when an individual decides to adopt or reject the innovation.
- Implementation: This phase occurs when an individual uses an innovation.
- Confirmation: This phase occurs when an individual decides to continue to use the innovation or discontinuance occurs.

This report focuses on the knowledge phase of the diffusion of innovation process. Previous research has revealed the main channels that send messages to an individual during the knowledge phase (Rogers, 1983). Mass media channels consist of a mass medium such as radio, television, newspaper, etc., and have the benefit of being able to reach a large audience rapidly. Additionally, mass media channels create knowledge and spreads informational quickly to individuals. Another channel in the knowledge phase is the interpersonal channel. Interpersonal channels involve direct communication between two or more individuals and this channel has a greater effectiveness in changing the negative views an individual may have of an innovation. (Rogers, 1983).

Through the diffusion of innovation framework, we are interested in understanding the knowledge phase of Tesla electric vehicle adoption. Determining the main channels in which the interviewees learned about Tesla vehicles can provide important information on the channels that are most effective at increasing consumer adoption of electric vehicles.

Literature Review

1. Barriers to Electric Vehicle Adoption

Research on the barriers to electric vehicle adoption has revealed key factors impeding electric vehicle adoption. The cost of purchase and ownership is a barrier as the average cost of an electric vehicle is higher than the average cost of an internal combustion engine (ICE) vehicle (Krishna, 2021; Vassileva & Campillo, 2017). Research has found that the higher purchase price of an electric vehicle is an important barrier that is preventing widespread adoption of electric vehicles as it is still economically favorable to purchase an ICE vehicle (Hosseinpour et al., 2015; Metais et al., 2022). Additionally, range anxiety which refers to consumers' concerns over the distance an electric vehicle can travel in a single charge of battery, is a barrier to electric vehicle adoption (Krishna, 2021; Noel et al., 2019; Vassileva & Campillo, 2017). The range of an electric vehicle varies depending on the size and condition of the battery however most electric vehicles have a lower driving range than ICE vehicles (Metais et al., 2022). Lastly, charging infrastructure availability and presence has a crucial role in electric vehicle adoption. Lack of

charging infrastructure is a key barrier in low-income and rural communities (Krishna, 2021), and for consumers living in housing types that do not allow for accessible at home charging (Broadbent et al., 2018). There is a unique challenge arising due to drivers that are reluctant to purchase an electric vehicle without robust charging infrastructure and operators that are hesitant to invest in infrastructure if there is not sufficient demand (Metais et al., 2022). Cost of purchase, range anxiety, and insufficient charging infrastructure are the key barriers determined by recent research. These barriers only occur if consumers are aware and knowledgeable of electric vehicles. Thus, the awareness of electric vehicles among consumers is a critical factor to understand.

2. Consumer Awareness of Electric Vehicles

Recent research on consumer engagement with PEVs has shown a lack of substantial growth in consumer awareness since the introduction of PEVs to the market. A study comparing Canadian new vehicle buyers (Long et al., 2019) in 2013 and 2017 found that stated familiarity and experience with PEVs was low for both samples despite the five-year gap. The study found that less than a quarter of respondents considered themselves familiar with PEVs in 2013, and in 2017 familiarity was significantly lower. Within California, a study comparing surveys from car-owning households in 2014 and 2017 found no significant change in awareness and understanding of PEVs. There was no increase in household's awareness of incentives, experience driving a PEV, and vehicle name recognition. Specifically, ¾ of respondents in the 2017 survey either stated they can't name a PEV or attempted to name one and provided an answer that was clearly wrong. Tesla (Roadster, Model S, and Model X) were correctly named by the highest percentage (18%) of survey respondents (Kurani, 2019).

In addition to a lack of awareness of PEVs, few consumers are considering purchasing a PEV and the common engagement strategies are not effective at encouraging purchase. A study on vehicle owning households in Sacramento, California found that many households were not considering purchasing a PEV. Consideration to buy a PEV was not associated with purchase and use incentives, PEV advertisements, outreach events, and charging infrastructure deployment (Hardman et al., 2020). These studies show that the current policy levers and engagement initiatives are not the main reason consumers are purchasing a PEV. Research into the main source of information utilized by PEV buyers in California prior to purchasing their PEV, found word of mouth and the internet to be used the most by these buyers (Meckler-Pacheco & Hardman, 2021). However, these previous research efforts have not determined the initial source of awareness for electric vehicle buyers.

Consumer awareness of PEVs is critical to the adoption of this technology as research has found consumers who have exposure to electric vehicles are more likely to value them more seriously and consider them a choice for future purchases (Kurani et al., 2016; Larson et al., 2014). Thus, our study aims to understand how Tesla has created consumer awareness within California PEV owners.

Methods

To address the questions of this research project, a qualitative approach was utilized. 35 semi-structured interviews with partially automated Tesla electric vehicle owners in California were analyzed. The interviews were conducted in 2019 and included the discussion of a variety of

factors important to understanding the effect of partially automated vehicles on driving behavior. For more information about the interviews see (Hardman, 2021). The sample recruited for the interviews came from a database from prior data collection. The database used was from four surveys administered to PEV buyers in California. The surveys were administered by researchers at the UC Davis Plug-In Hybrid and Electric Vehicle Research Center (PHEV) and the California Air Resources Board invited participants that had received the California Clean Vehicle Rebates. From the survey database, 142 potential interviewees were invited via email to participate in the project and 35 agreed to an interview. No incentives were offered for participating and the interviews were conducted between June and November 2019. The topics discussed with interviewees, relevant to this study, are listed below.

- How did you originally find out about Tesla vehicles?
- How did you originally find out about electric vehicles?
- Did you know about electric vehicles before you knew about Tesla or did Tesla vehicles make you aware of electric vehicles?

Thematic data analysis was conducted on the interview transcripts using a hybrid approach that involved inductive and deductive reasoning. The hybrid method combines the work of researchers Boyatzis, Crabtree and Miller (Boyatzis, 1998; Crabtree & Miller, 1999) to create three iterative phases of analysis. In the first phase, a priori codes were created based on the research aim of this project and previous research on consumer engagement with electric vehicles. Table 1 displays the set of a priori codes that were deductively created. During phase 2, a posteriori codes were created as the interviews were analyzed. These codes were inductively created and derived from the data gathered in the interviews. Table 1 shows the codes created a posteriori. The code lists were then combined, and all interviews were analyzed based on the codes (Fereday & Muir-Cochrane, 2006). The hybrid coding method was selectively done on sections of the interviews in which the questions above were asked to the interviewees. The selective coding occurred after open coding was conducted on all interviews. The process was on-going and iterative and continued until all interview transcripts were read through. Thematic analysis was conducted in NVivo.

Table 1: List of a priori and a posteriori codes created for coding the interviews.

A Priori Codes	A Posteriori Codes
Consumer Help Sites	Workplace Exposure
Forum and Blogs	Electric Vehicle Clubs
Articles	University
News	Tesla Showroom
Word of Mouth	Online News
Marketing	Media
	Unknown Research

Results

The following results are how interviewees reported initially learning about Tesla vehicles. A total of 30 interviewees were asked about how they found out about Tesla vehicles specifically. A total of 5 interviewees were asked about how they specifically found out about electric vehicles. The main sources determined from analysis of the interviews include media, internet, word of mouth, workplace exposure, university, movies, marketing, EV clubs, Tesla Showroom, and unknown research (Table 2).

Interviewees were also asked if they had known of electric vehicles or Tesla vehicles first. A total of 22 interviewees stated learning about electric vehicles first and then becoming aware of Tesla vehicles. Five interviewees stated Tesla vehicles were the first electric vehicle they learned about. In the analysis of 8 interviews, it was not possible to determine whether the interviewee had learned of Tesla vehicles or electric vehicles first. A total of 35 interviews were analyzed.

First the results explore how interviewees learned about Tesla electric vehicles, then they explore how interviewees learned about electric vehicles.

Table 2: Definitions for themes used in qualitative analysis, and example quotes.

Themes	Definition	Example from Interviews
Word of Mouth	A form of interpersonal communication in which information is passed from person to person using oral communication.	<i>“Well, what happened is a neighbor got one [Tesla vehicle]. And I saw him one day and saw him at a party. I said, ‘Did I see you driving a Tesla the other day?’ He says, ‘Yeah, I love it.’ I said, ‘Well, one day take me for a ride in if you would.’ ‘Oh yeah, I’ll do that.’ Well two months later he shows up...he says, ‘You ready for that Tesla ride?’” (Interviewee 12)</i>
Media	A form of mass media that focuses on delivering information to the public. Includes newspapers, magazines, books, movies online new sources, and TV news.	<i>“Oh, just kind of reading about it, you know, popular magazines. Early on when they were just trying to create a concept, two-seater, there were a couple of good articles I think in Wired magazine.” (Interviewee 3)</i>
Internet	An online platform that allows for access to a variety of source of information such as consumer help sites and blogs sites.	<i>“So, it was just kind of like, small little hearsay online. You know, maybe someone dropped a few little words about some future, you know, affordable car that Tesla might have, and I was looking at the Model S” (Interviewee 11)</i>
Unknown Research	Unable to determine the source of information however the information was	<i>“And then as I did more and more research, I heard about this company called Tesla that was doing only electric. And I said, ‘As soon as they</i>

Themes	Definition	Example from Interviews
	obtained through a form of research.	<i>make one that I can afford, then I want one.”</i> (Interviewee 19)
Workplace Exposure	Gaining awareness at the place of employment.	<i>“I liked the whole high tech. I was working in high tech. We actually were right across the street from the Tesla factory, right across the freeway where I was working.”</i> (Interviewee 16)
Electric Vehicle Clubs	Social club that includes people interested in electric vehicles and a place to share information about electric vehicles.	<i>“I belong to the Sacramento Electric Vehicle Group, Club, Association, whatever they call it. And they [Tesla] may have been in one of their newsletters.”</i> (Interviewee 15)
University	Gaining awareness at school and/or at a place of education.	<i>“I first heard of Tesla back in 2007 when I was doing my MBA and there were case studies about this guy who had this wild idea.”</i> (Interviewee 8)
Marketing	A way of exchanging information about a product to potential customers.	<i>“I think when they first came out, I was like, “Oh, my gosh, look at this. A fully electric car that you can just plug in.” And I guess there were other ones, but maybe there weren't just marketed as heavily. It probably was the marketing of it[Tesla], I would say for sure”</i> (Interviewee 34)
Tesla Showroom	Tesla owned and operated stores that showcase the vehicles and serve as a dealership for Tesla vehicles.	<i>“And I was just in, I think it was in Marin at a conference and there was a Tesla, you know, show room, kind of thing. And I sat in[a Tesla vehicle], and I saw that big screen. I'm like, “Oh.” (laughs). So that's how it came about.”</i> (Interviewee 27)

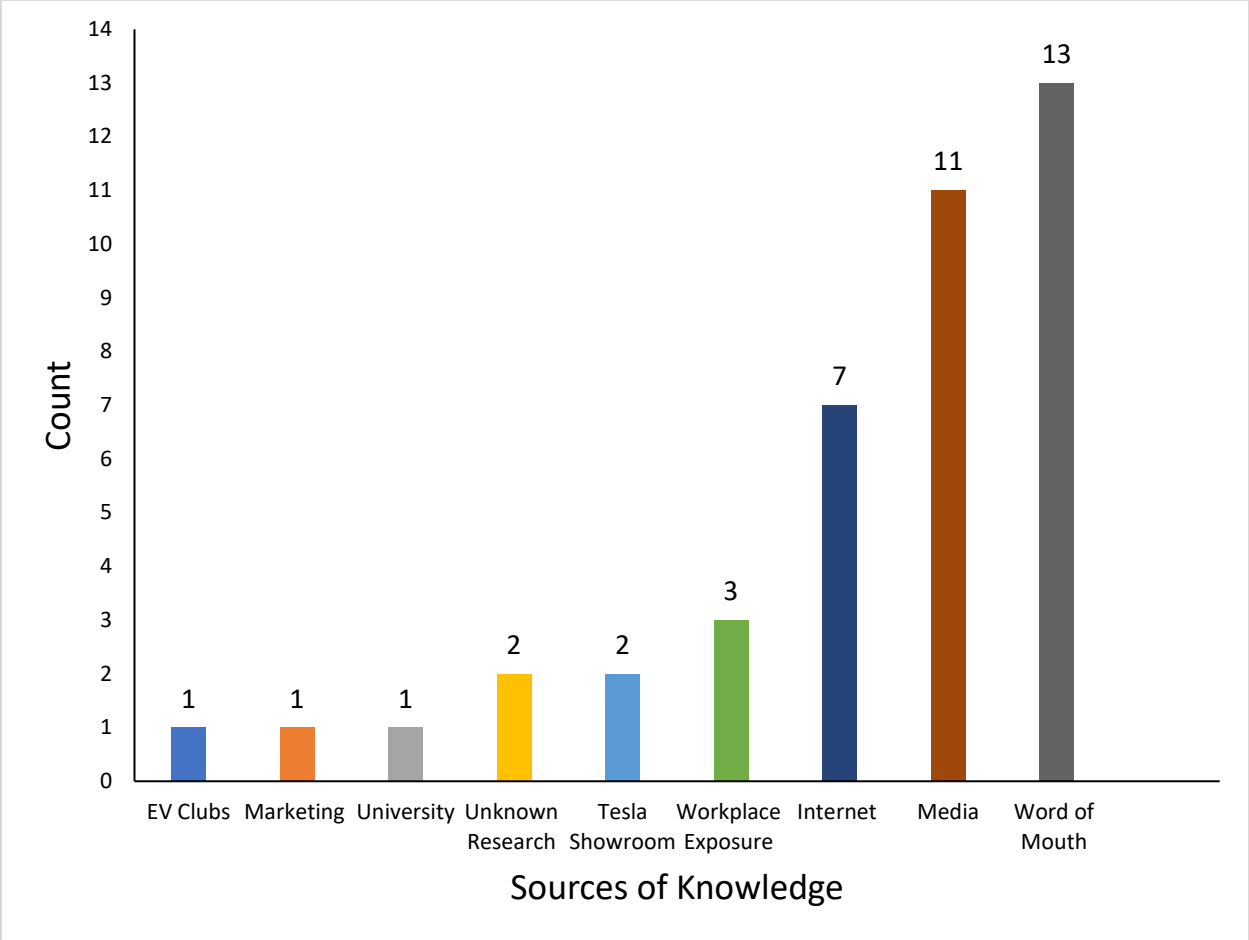


Figure 1: Sources of knowledge for Tesla vehicles. (n=30)

Table 3: Count of key themes of codes.

	Count
Word of Mouth	13
Friends and Family	10
Strangers	1
Co-workers	1
Unknown Word of Mouth Source	1
Media	11
Articles	3
Magazines	2
Unknown News Source	2
Books	1
Online News	1
TV News	1
Movies	1
Internet	7
Forum and Blogs	3
Consumer help sites	2
Unknown Internet Resource	2
Workplace Exposure	4
Tesla Showroom	2
Unknown Research	2
University	1
Marketing	1
EV Clubs	1

Source of knowledge for learning about Tesla vehicles

1. Word of Mouth

A total of 13 interviewees reported word-of-mouth sources as the way they learned about Tesla vehicles (Figure 1). Specifically, 10 interviewees reported learning about Tesla vehicles with friends and family (Table 3). The interviewees described causal conversations about the vehicles and for some interviewees they had the opportunity to drive the vehicle.

“So, we first got interested in electric vehicles in 2015 when my oldest son who works in technology in Santa Clara said, Dad, I’m thinking about buying a Tesla. And my wife said, I think maybe we will too... Well, it was through my son and through just kind of word of mouth. She was getting ready to make a change in vehicle and we actually went looking and shopping.”

(Interviewee 18)

"I knew somebody who invested in Tesla and bought a Roadster. He used to live over the other side of Menlo Park." (Interviewee 24)

"And then I was, I dunno, a friend and I were walking to lunch, and we were just chatting about it." (Interviewee 32)

One interviewee reported co-workers as the source for learning about Tesla vehicles (Table 3).

"I made the mistake, or the good fortune, however you want to view it, in 2014 of driving one of our consultant's Tesla. That was it. It was like, you've got to be kidding me. I felt I was on the set of the Jetsons in the future, silent, powerful, quick, beautiful" (Interviewee 7)

Additionally, one interviewee reported a stranger, and one interviewee reported a word-of-mouth source that could not be determined (Table 3). The interviewees mentioned positive experiences with their friends and family during which they first learned and experienced Tesla vehicles.

2. Media

A total of 11 interviewees mentioned a type of media as the source of how they learned about Tesla vehicles (Figure 1). Specifically, three interviewees reported articles that provided initial information about Tesla and resulted in them continuing to research to obtain more information (Table 3).

"I saw an article where they were offering leases for \$700 a month. I just thought, "That's doable." From there I started researching." (Interviewee 13)

"I think just mainly reading articles, and I like the whole philosophy of the car. How it's built, starting from scratch." (Interviewee 29)

One interviewee reported learning about Tesla vehicles through a book and two reported magazines as the source of knowledge (Table 3). These sources allowed them to learn about Tesla vehicles in a formal setting and often from sources they viewed as reputable and credible.

"I read a book about Elon Musk and Tesla. I mean an Elon Musk book...Elon Musk: Tesla and the Fantastic Future, something like that. And that really clued me into what an extraordinary man he was. Because I hadn't put together that SpaceX was his, and SolarCity was his, and Tesla, that those were all Musk projects. Um and then...the [Model] S had already come out by that point. And so, it was those were all, like, real cars that people could actually afford."
(Interviewee 22)

"I'm familiar with, worked as a little kid getting greasy when my dad owned a garage, and I subscribe to Automobile Magazine and my December issue has the Tesla Model S, automobile of the year. And I thought, wait a minute. This is an all-electric car, and this is an ICE (laughs)

magazine, I mean it's for ...Combustion engine cars, right? And that's, that's how ... Because I knew of Tesla, but, through the sports car, the Roadster.” (Interviewee 20)

One interviewee mentioned online news and TV news, two interviewees reported an unknown news source, and one interviewee mentioned a movie (Table 3).

“Well, it was all over the media. I mean, you know, you look at any Google News article, or you know, I was gonna say, you know, I don't watch much television, but even then, like, I'm sure it was in the news” (Interviewee 5)

3. Internet

A total of seven interviewees reported the internet as the way they learned about Tesla vehicles (Figure 1). Specifically, two interviewees reported consumer help sites such as Consumer Reports (Table 3).

“Well, when they first came out, you know, I was real impressed with the Consumer Report rating on them. They gave them, you know, like an A++.” (Interviewee 30)

Additionally, three interviewees reported forums and blogs, and two interviewees mentioned an unknown internet source (Table 3). The forum and blogs were specific to automobiles and appeared to be sites that the interviewees would often browse and gather information from.

“Online media, car and driver motor trend, or whatever. It's called Jalopnik. They're fun and quirky online forum.” (Interviewee 17)

4. Workplace Exposure

A total of three interviewees reported learning about Tesla vehicles while at work (Figure 1). These interviewees had the unique experience of working for Tesla and learning about the technology through their work.

“When Tesla bought Solar City, I went over to Tesla. There, I worked last couple years at Tesla...So being in the energy, you could see that I was compelled to buy.” (Interviewee 10)

“While I was in law school, I was actually part time at Tesla as product specialist. That's how I get my first involvement. Back then in 2014 I thought Tesla was a fun, innovative car company that mostly catered to kind of the higher end market.” (Interviewee 17)

5. University

A total of two interviewees reported learning about Tesla vehicles while at a place of education (Figure 1).

“Uh, I first heard of Tesla back in 2007 when I was doing my MBA And there were case studies about this guy who had this wild idea, and we were all supposed to put together marketing strategies and talk about, is he gonna pass the test of time and fail it.” (Interviewee 8)

6. Marketing

One interviewee reported the marketing of Tesla vehicles as the way they learned about the vehicles (Figure 1). It is interesting that an interviewee mentioned the marketing of Tesla as Tesla does not use traditional forms of marketing.

“I think when they first came out, I was like, “Oh, my gosh, look at this. A fully electric car that you can just plug in.” And I guess there were other ones, but maybe there weren't just marketed as heavily. It probably was the marketing of it, I would say for sure” (Interviewee 34)

7. EV Clubs

One interviewee reported learning about Tesla vehicles through electric vehicle clubs and by getting involved in the electric vehicle community (Figure 1).

“So got involved and started following this Sacramento EV Club, started going to those things” (Interviewee 7)

8. Unknown Research

A total of 2 reported unknown sources of research as how they learned about Tesla vehicles (Figure 1).

“And then as I did more and more research, I heard about this company called Tesla that was doing only electric. And I said, ‘As soon as they make one that I can afford, then I want one.’” (Interviewee 19)

9. Tesla Showroom

A total of two interviewees reported learning about Tesla vehicles through Tesla showrooms (Figure 1).

“And I was just in, um, I think it was in Marin at a conference and there was a Tesla, you know, show room, kind of thing. And I sat in, and I saw that big screen. I'm like, “Oh.” (laughs). So that's how it came about.” (Interviewee 27)

Sources of knowledge for learning about electric vehicles

The following results are for how interviewees reported initially learning about electric vehicles.

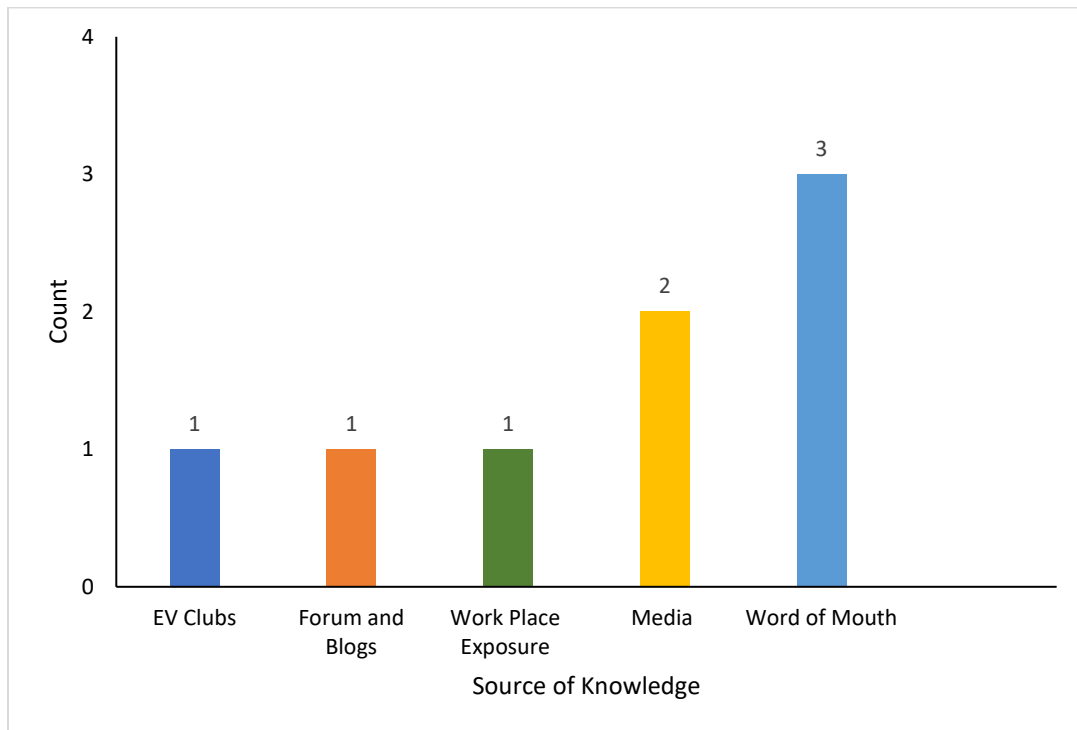


Figure 2: Source of knowledge for electric vehicles. (n=5)

1. Word of Mouth

A total of three interviewees reported a word-of-mouth source as how they learned about electric vehicles (Figure 2). Specifically, two reported co-workers as the word-of-mouth source and one reported friends and family as the word-of-mouth source.

“So, my wife and I had a goal of buying one after I think it was 2007 when we saw Who Killed the Electric Car. Which, you know, I was completely unaware that these things existed, had never heard of them or seen them and a friend of ours at work said, “Oh, you guys should see this movie.” And, uh, so we all went and saw, and I was shocked. You know, I had never even heard of these things.” (Interviewee 1)

“I remember talking to one of my friends maybe four years ago, and they're like, “Oh, I saw this, the electric RAV4.” And you know, that's a really old vehicle. And he was like, “It was in great condition.” And I was like, “What year was that?” So we started talking about it. So yeah, I mean, the people that are kind of into that.” (Interviewee 35)

2. EV Clubs

One interviewee reported learning about electric vehicles through an electric vehicles club (Figure 2).

“I belong to the Sacramento Electric Vehicle Group, Club, Association, whatever they call it. And they may have been through one of their newsletters.” (Interviewee 15)

3. Media

Two interviewees reported learning about electric vehicles from media, specifically online news and movies (Figure 2).

“That’s a good question. I think just news media saturation online” (Interviewee 35)

“Right. Um, how did you end up coming about like buying the- the RAV4, the electric vehicle?” [Interviewee] “Uh, it was total chance. So, my wife and I had a goal of buying one after I think it was 2007 when we saw Who Killed the Electric Car.” (Interviewee 1)

4. Workplace exposure

One interviewee reported learning about electric vehicles through their job and place of employment (Figure 2).

“I worked in that program for while and then I was invited to write something called the Biannual Report, which is a big annual energy policy report for the governor. And, in doing that report, that was when I learned about the original electric vehicle mandate and thought it was so interesting to see the fight. Literally the fight between the oil industry and the electric industry.” (Interviewee 9)

Discussion

1. Tesla Vehicle Awareness

Analysis of 30 interviews revealed the main sources and ways the interviewees became aware of Tesla vehicles. The highest number of interviewees reported word of mouth as the source they initially learned about Tesla vehicles from. A total of 13 interviewees reported word of mouth which included friends and family, strangers, and co-workers. Specifically, friends and family were the majority of the word-of-mouth sources mentioned by interviewees. These results suggest that the interviewee’s social network influenced their awareness of Tesla vehicles. This “neighborhood effect” which describes the influence of geographic neighbors ownership of an electric vehicle on a consumer’s decision to adopt an electric vehicle, has been found in previous research (Axsen & Kurani, 2011; Chakraborty et al., 2022; Jansson et al., 2017; Morton et al., 2018; Rodrigues et al., 2019). Liu et al. found that hybrid electric vehicle adoption exhibits significant spatial effects such that people tend to adopt hybrid electric vehicles when their geographic neighbors adopt them (Liu et al., 2017). Other research discovered that social networks and interpersonal influence plays an important role in consumers assessment of hybrid electric vehicle technology (Axsen & Kurani, 2011).

Our results support previous research findings and highlight the importance of social networks and geographic neighbors in the interviewees process of learning about Tesla vehicles. Interviewees mentioned learning about Tesla vehicles through their son (Interviewee

18), through a friend (Interviewee 32), and through neighbors (Interviewee 12). Thus, the neighborhood effect and social networks influenced interviewees awareness of Tesla vehicles. Additionally, our results highlight the effectiveness of interpersonal communication in the diffusion of innovation process. Interpersonal communication which occurred for the interviewees through word of mouth sources has been found to be more persuasive and effective means of communication for the adoption of an innovation (Rogers, 1983). Our results support the claim that interpersonal communication, as a communication channel, is effective at changing an individual's view of an innovation.

Media was another key resource reported by interviewees as 10 interviewees mentioned a type of media as how they learned about Tesla vehicles. These results align with another main means of communication discussed in the diffusion of innovation process. Mass media channels such as articles, movies, and the news are able to quickly reach a large audience and allows information to spread to individuals (Rogers, 1983). The effectiveness of mass media channels can be seen in our results which show many interviewees initially learning about Tesla vehicles through this channel.

Similar to media is the internet which was a key resource reported by interviewees as 7 interviewees mentioned an internet resource as how they learned about Tesla vehicles. Specifically, forum and blogs and consumer help sites were the sites on the internet reported by interviewees. Tesla vehicles received a high Consumer Report rating which was how interviewee 30 learned of Tesla vehicles. Further, sites such as Jalopnik, an automobile news website, was where interviewee 17 learned about Tesla Vehicles. Tesla was able to create vehicles that received positive reviews online and gain a notable online presence that captured the awareness of the interviewees.

Lastly, our results for Tesla vehicle awareness reveal that certain consumers were connected to clean energy technology through their professional work which resulted in interviewees learning about Tesla vehicles. Three interviewees reported learning about Tesla vehicles through workplace exposure. Interviewee 10 worked for Solar City, which was bought by Tesla in 2016 and interviewee 17 worked at Tesla. These interviews highlight a unique and perhaps small subsection of the consumer base as not all consumers of Tesla vehicles work at or with the Tesla company. However, workplace exposure may become an important source of awareness as companies and industries strive to become more sustainable and fulfill environmental, sustainability, and governance (ESG) goals.

2. Electric Vehicle Awareness

Analysis of five interviews reveal where Tesla owners learned about electric vehicles. In this smaller sample size, word of mouth was still a main source of how interviewees learned about electric vehicles with two interviewees reporting co-workers and one interviewee reporting friends and family. Other sources of media such as online forums and blogs, online news, and movies were sources cited by interviewees. Lastly, workplace exposure was a source mentioned by one interviewee and highlights how as industries become more sustainable and focused on electric vehicles, awareness of this technology may increase. Overall, the small sample size provides limited insight however our results suggest that word of mouth is an important source for awareness of electric vehicles among the interviewees. Additionally, the results reveal the similarities between how the interviewees learned about electric vehicle and Tesla vehicles.

3. Awareness of Electric Vehicles verse Tesla

When asking interviewees if they had learned about Tesla vehicles or electric vehicles first, a total of 22 interviewees learned about electric vehicles first. A total of five interviewees stated Tesla vehicles were the first electric vehicle they had learned about. These results suggest that a majority of the interviewees learned of electric vehicles first and then decided to ultimately purchase a Tesla vehicle. These are interesting findings as it suggests that the vehicles Tesla has created are a potentially more desired vehicle than other electric vehicles currently for sale for the interviewees. However, it is important to note that these interviews were conducted in 2019 when there were less models and availability of electric vehicles (Gersdorf et al., 2020).

Conclusion

The results from this research suggest that word of mouth interactions and social networks have an important role in how the interviewees became aware of Tesla vehicles and of electric vehicles more broadly. Our findings support previous research that has shown the neighborhood effect and how social connections influence electric vehicle adoption. Additionally, our results suggest that the internet and media were source of Tesla vehicle awareness for interviewees. These findings imply that despite a lack of marketing from Tesla (Dudovskiy, 2021), the company has created a dominate presence on the internet that exposed the interviewees to the vehicles. However, while Tesla vehicles continue to dominate the market share of electric vehicles in the U.S. (Kane, 2022), our results show that a majority of interviewees learned about electric vehicles before they learned about Tesla vehicles. Interviewees ultimately purchased a Tesla vehicle which suggest that Tesla has created a vehicle that is more attractive and desirable by the interviewees when compared to other electric vehicles.

Policymakers, automobile manufactures, and other relevant stakeholders can utilize the findings of this research to make informed decisions to increase consumer awareness of electric vehicles. Given that word of mouth is an important source of awareness, automobile manufactures can create referral programs that incentivize consumers to engage with their social networks and strangers about their electric vehicles. Tesla had a referral system until September 2019 that allowed owners of Tesla vehicles to earn prizes such as free Supercharging miles and chances to win a Tesla Roadster (Tesla, n.d.). Programs such as Tesla's can assist automobile manufacturers in increasing vehicle sales and at increasing overall electric vehicle awareness among automobile consumers. Policy makers can support automobile manufacturers' incentive programs and create other incentives that encourage consumers to engage with electric vehicles in their social networks.

Future research is necessary to better understand the success of Tesla and how to encourage greater electric vehicle adoption. As more electric vehicle models become available, it will be important to continue to track the success of Tesla as other models may become more dominate in the market share of electric vehicles. It is also important to better understand how consumers purchasing used PEVs are becoming aware of electric vehicles. As the used PEV market continues to grow, it will be interesting to see any differences and similarities in consumer awareness. Ultimately, additional research that determines what sources are influencing electric vehicle awareness can assist policymakers and relevant stakeholders at increasing electric vehicle adoption.

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