Developing the 'Schedule Advisor' Web Application at the University of Virginia

How have different social groups influenced and been shaped by the development, acceptance, and market trends of EVs?

A Thesis Prospectus
In STS 4500
Presented to
The Faculty of the
School of Engineering and Applied Science
University of Virginia
In Partial Fulfillment of the Requirements for the Degree
Bachelor of Science in Computer Science

By
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October 24, 2023

On my honor as a University student, I have neither given nor received unauthorized aid on this assignment as defined by the Honor Guidelines for Thesis-Related Assignments.

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Introduction:

A revolutionary shift has occurred in the automotive industry thanks to the emergence of Electric Vehicles (EVs). Once considered inefficient and costly, these vehicles have now become a prevalent presence on roads across the world. The transition toward EVs can be attributed to various factors involving different societal causes: prominent manufacturers like Tesla redefining the industry (Perkins & Murmann, 2018) or established automakers such as General Motors adapting to stay in the game (Gomes, 2022) and policymakers at various governmental levels drafting legislation involving this new technology.

The concept of EVs is not entirely new in history. The very first prototype dates back to the early 19th century (WILSON, 2023). In recent times, EVs have experienced a revival as not just cutting-edge technology but as instrumental tools to solve rising carbon emissions and environmental degradation (Leard & McConnell, 2020). Many important events and trends in the past decade further solidify the position of EVs within the global automotive landscape. China has risen as the top market for EVs due to its aggressive policies and expanding consumer base (Li et al., 2018). Meanwhile, Tesla's creative business strategies, innovations, and visionary pursuits have established itself as the industry leader (Perkins & Murmann, 2018). To comprehensively examine the dynamics of the EV world, I will employ the Social Construction of Technology (SCOT) framework. By adopting this framework, I intend to explore the influence between societal groups and their perspectives in shaping the development of electric vehicles. This approach will provide a holistic understanding of how these interactions impact public perception, policy creation, and the larger economic implications of EV adoption.

Technical Topic

For my Technical Topic, I want to talk about my software development experience of an application called Schedule Advisor. It is a web application that aims to facilitate efficient course scheduling for the students at the University of Virginia. This project, using the Django and Bootstrap framework, demonstrates the practical side of my computer science studies particularly in web programming and user interface design. The program makes it simple for students to search and elect courses, greatly improving their experience. My role in this project mainly includes user interface design and experience testing from concept to conclusion. The Schedule Advisor not only displays my skills in software engineering, but it also solves an everyday problem that many people face in the University of Virginia Community.

Research Questions and Methods

At the center of my research lies an important question: How have different social groups influenced and been shaped by the development, acceptance, and market trends of EVs? Moreover, how have these interpretations impacted public perception and subsequent policy decisions? These questions aim to uncover the special dynamics between socio-economic debate and innovations. Understanding these complex interactions is a vital step of building a sustainable future. To answer this question, I will analyze government reports, such as the stance of the Biden Administration on EVs (The White House, 2023) as well as policies of foreign countries, including China's aggressive EV expansions (Li et al., 2018). Additionally, I will examine the marketing strategies used by manufacturers like Tesla and investigate the increase in EV sales during the 2010s (Muratori et al., 2021). By evaluating these factors, I aim to gather

valuable insights into the motivations, challenges, and impacts faced by various stakeholders within the EV ecosystem.

STS Topic

The global automotive industry is undergoing immense change, and I observe that certain societal forces are key catalysts.. Electric vehicles (EVs) not only offer an insight into the future of transportation, but they also reflect our changing relationship with technology, the environment, and economy. Within the EV domain, Tesla has emerged as a game-changer despite being relatively new (Perkins & Murmann, 2018). Established companies like General Motors are now forced to adjust their strategies to keep up with this electric wave (Gomes, 2022). However, it's important to note that this shift doesn't occur in isolation; various social groups contribute to and are influenced by this transformative movement. Manufacturers, consumers, legislators, and environmentalists all provide unique viewpoints that affect the EVs destiny.

Initially driven by the search for alternatives to combustion engines rather than environmental responsibility, this narrative changed as global environmental concerns grew alongside advancements in battery technology and renewable energy sources (WILSON, 2023). EVs emerged as symbols of hope in combating climate change by reducing carbon emissions.

When talking about EVs' impact internationally, China's role in this landscape cannot be ignored—their aggressive policies, significant investments, and enthusiastic consumer base have propelled them to become leaders in the EV revolution (Li et al., 2018). Furthermore, the success of companies like Tesla, with their strategic vision and innovative approaches, demonstrates the

potential to redefine entire industries and surpass legacy automakers in overall market capitalization.

For the STS framework, I will apply Pinch and Bijker's social construction of technology (SCOT) to analyze the complex narrative. SCOT emphasizes how technology is not solely a result of engineering brilliance but also deeply rooted within societal values, needs, and interpretations—allowing us to explore its co-constructive nature with society itself (Pinch & Bijker, 1984).

To set the stage for this research, I need to first identify the key players involved. On one hand, there are the manufacturers, including innovative companies and traditional automotive giants. Each of these corporations is working to establish its footprint in the developing EV market. Their strategies, decisions, and advancements affect the overall landscape, influencing the public opinions. Consumers constitute another diverse group with varying motivations. From people who are environmentally conscious seeking to reduce their carbon footprint to brand loyalists or those driven by economic factors – their choices directly impact manufacturers' methods which consequently shape EV future (Bryła et al., 2022). On the political side, the policy makers' decisions can either accelerate or hinder EV progression. Their role involves crafting supportive policies as well as building infrastructure for the transition (Rapson & Muehlegger, 2023). Lastly there are environmental advocates - voices that consistently emphasize the urgent need for sustainable solutions. Through various campaigns and protests, their effort put pressure on policymakers to take action (Galst, 2023).

While I focus mainly on these groups, outside influences cannot be ignored entirely. Energy companies, with fluctuating gasoline demands, find themselves at the frontline of this period; their narratives provide valuable context to the broader picture (Kah, 2018).

The Social Construction of Technology (SCOT) framework forms the foundation for this exploration. Through this model, it can reveal not only how different groups perceive EVs but also how these impressions influence the future of this technology. Essentially, this research goes beyond taking EVs as a technology, but a search to understand the impact of different forces that both shape and are shaped by this transformation.

Key Texts

Through the research of understanding the dynamics of EV market and society, I have identified several primary sources to be instrumental. In GM's 2022 Annual Report, the company envisions a future with zero emissions, marking their strategic shift towards EV and autonomous vehicles (General Motors Company, 2022). Their plan to increase EV production and expand EV infrastructure illustrates the industry's commitment to a more sustainable future for transportation. This report indicates the transformative strategy for a traditional automaker to adapt to the EV trend and their approach to overcome infrastructure development challenges. The Biden-Harris Administration policies on EV highlights their effort in fostering the growing market (The White House, 2023). The initiatives for a more affordable EV market and investment in infrastructure signaling a strong support from the government towards environmental sustainability. These official statements are essential to comprehend how policy influences market dynamics and consumer adoptions. A key aspect of my research is public opinion on EV, and the Pew Research Center's report on American views of EV offers a good insight (Spencer, 2023). The report reveals that environmental awareness and economic factors influence the consumers' attitudes towards EV. Understanding the public's view is critical in assessing the market potential and constraints. The "2022 Plug In America Survey Report" looks

closely into the experiences and motivations of EV owners and those considering purchasing an EV. It covers the reasons for obtaining EVs, with a significant emphasis on environmental concerns and cost savings (Plug In America, 2022). Additionally, the report looks at the public charging experience, focusing on topics like charger functionality and availability.The survey is important for my research as it provides a direct perspective from present and prospective EV users, highlighting major areas for growth in the EV ecosystem as well as consumer preferences.

Conclusion

By using the Social Construction of Technology (SCOT) to examine the interactions between manufacturers, consumers, decision-makers, and environmentalists, I expect to uncover the complex relationships that influence the creation and acceptance of EVs. The results of this research aim to show the role that each social group contributes in the progression of the EV business and its resulting impact on public perception and policy development. I hope that by doing so, I may help future generations create a cleaner, greener, and more efficient transportation environment through a more educated and coordinated effort.

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