FACTORS AFFECTING CONSUMER RESISTANCE TO INNOVATION IN ELECTRIC CAR INDUSTRY IN TURKEY

[1]Sayed Mudassir Sayeed, [2]Assist. Prof. Dr. MURAT UNANOĞLU

[1]Department of Business Administration, Business Administration Program

Istanbul aydın unıversıty, ınstıtute of graduate studıes

[1]MBA THESIS, [2]Thesis Advisor

Corresponding Author Email: SayedSayeed@stu.aydin.edu.tr

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Abstract: **The study looks at the many aspects that lead to Turkish consumers' reluctance to embrace electric cars (EVs). Using a mixed-method approach that includes both qualitative data and quantitative surveys, the research reveals a range of hurdles, from psychological and infrastructural to technical and economic. Information was acquired from a broad group of prospective automobile purchasers in different parts of Turkey. The results show that substantial opposition still exists in spite of rising environmental consciousness and government incentives. The high initial cost of EVs, the lack of a suitable infrastructure for charging them, worries about battery life and maintenance, and a predilection for traditional internal combustion engine cars are some of the key barriers. The purpose of this study is to offer practical advice to manufacturers, politicians, and other interested parties so they may plan ahead and successfully promote the adoption of electric vehicles in Turkey.**

Keywords: **Innovation, Turkey, EV, Consumer, Resistance.**

I.   INTRODUCTION

According to (UNEP, 2018), the transportation sector is the one greenhouse gas (GHGs) at the highest pace and is expected to contribute more than 30% of GHG outflows going forward. Almost 70% of all transportation-related emissions of substances that deplete the ozone layer occurred in Europe in 2019. Between 2019 and 2021, Turkey saw the largest increase in fossil fuel byproducts overall 7.9%, (Crippa, et al., 2022). Fossil fuel byproducts increased by 3% in Turkey's transportation sector in 2021 compared to 2020. More than 60% of transportation-related CO2 emissions in large cities like Istanbul come from petroleum-derived automobiles (Ferraris, Santoro, & Papa, 2018). Transportation discharges should be reduced by 90% by 2050 in order to achieve environmental fairness (European Commission, 2022). Since vehicle emissions are a major contributor to the consequences of burning fossil fuels and air pollution in cities, the automotive industry is one of the many sectors that has witnessed a surge in creative thinking and invention. As the world moves toward electric transportation, electric cars have gained attention as an efficient way for the industry to lower greenhouse gas emissions and air pollution.

Regardless of whether attention to EVs is growing out to be more widespread in Turkey, research on the components influencing buyer behavior and purchasing expectations has to concentrate on the regions neglected with reference to prior scholastic assessments. The adoption and reception of EVs will be influenced by social basis, as it is in almost every business. Focuses on led in other nations may inform research conducted in Turkey. It is vital to examine the elements influencing the purchasing decisions of Turkish clientele. The important data from this investigation will benefit the field

and policymakers, since it will be used to compile research to fill in gaps in the literature and integrate the disparate exploratory findings.

The layout of the study is as follows. The Literature Review and the techniques employed to conduct it are provided in the next chapter. In Chapter 4, the variables affecting consumers' inclinations to adopt EVs are discussed. Finally, chances for and advantages from more research are covered in depth in the findings and suggestions section.

A. Background

Recent years have seen an increase in the amount of attention paid to this issue; nonetheless, the majority of these efforts rely on traditional behavior assumptions that only consider the perspectives of EV users (Huang & Ge, 2019). Examples of these conjectures include the theory of planned behavior (TPB), the theory of reasoned action (TRA), and the rational choice theory (RCT). However, these conjectures ignore the reality that people ought to weigh the benefits and drawbacks of both established and emerging EVs when making a decision. The noteworthy diffusion of innovation theory (DOI) is therefore more useful in examining customer behavior with regard to the reception of EVs since it takes into account both the creative item and its cooperations with purchasers as well as how they differ from conventional items (Singh & Vaibhav, 2020). The DOI holds that the spread of an imaginative item depends upon five saw attributes (recognizability, relative benefit, similarity, intricacy, and trialability (Rogers, 2003).

While some scientists have considered the penetration of the EV market from the perspective of the DOI hypothesis (Peters & Dütschke, 2014), flow research only examines the noteworthy effects of certain creative components on an individual's purchasing behavior. Thus, it's unclear how differing regulations will affect how consumers evaluate these creative components.

B. Problem Statement

Reaching sustainable development goals, reducing emissions of substances that deplete the ozone layer, and improving air quality have all been praised as being contingent on the widespread adoption of electric cars. In any case, consumer opposition to advancements in the electric car space, especially in Turkey, fundamentally impedes widespread recognition. In order to facilitate the transition to electric cars (EVs), manufacturers, governments, and other stakeholders need to understand the reasons for this reluctance.

The problem is in the lack of knowledge regarding these confusing points of view, which makes it challenging to develop effective tactics to reduce customer blockage. A thorough investigation is anticipated to identify and examine the particular causes of Turkish buyers' hesitation. By removing these barriers, partners may be able to better adapt their business practices in order to meet customer preferences, increase the entry of electric vehicles into the market, and support Turkey's economic and environmental goals.

C. Purpose

It has been acknowledged that electricity is a more advantageous fuel source than gasoline. Electric vehicle technology does not, however, ensure societal adoption. There are still no appreciable improvements in the usage of electric vehicles from year to year. When internal combustion engine and steam automobiles were first launched in the early 20th century, electric cars were a competitor. The advent of internal combustion engine vehicles is a contributing element to the demise of electric vehicles. There are a number of reasons why individuals decide against driving electric vehicles. Those that drive electric cars cite high maintenance expenses, a short driving range, and a maximum speed as the major reasons they return to internal combustion engines (Liu, Song, Kubal, Susarla, & Knehr, 2021).

D. Objectives

- To determine the main causes of Turkish consumers' opposition to electric cars.

- To demonstrate how these issues could affect Turkish consumers' reluctance to purchase electric cars.

- To examine how economic, societal, and innovative pressures affect the adoption of electric automobiles.

- Evaluate how the Turkish electric car industry is progressing in relation to self-viability and inspiration, risk and assumptions, similarity and complexity, relative benefit, and inspiration.

- Examine how social judgments affect how advancements in the business are received.

E. Theoretical Framework
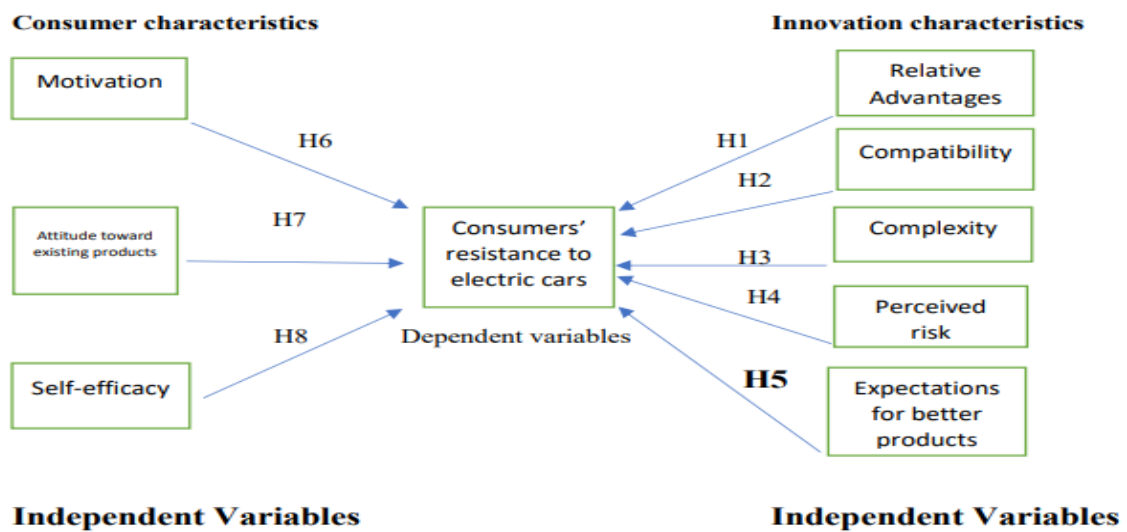
Şekil 1: Theoretical Framework

Source: (Hosseini, Delaviz, Derakhshide, & Delaviz, 2016)

F. Hypothesis

Hypothesis1. The lower the Relative Advantage, the higher the consumers' resistance to electric cars

Hypothesis 2. The lower the Compatibility, the higher the consumers' resistance to Electric cars Hypothesis 3. The higher the Complexity, the higher the consumers' resistance to Electric cars Hypothesis 4. The higher the Perceived Risk, the higher the consumers' resistance to Electric cars

Hypothesis 5. The higher the Expectation for Better Electric cars, the higher the consumers' resistance

Hypothesis 6. The lower the Motivation, the higher the consumers' resistance to Electric cars Hypothesis 7. The more favorable/positive consumers' Attitude towards normal electric cars, the higher the consumers' resistance to Electric cars

Hypothesis 8. The lower the Self-efficacy, the higher the consumers' resistance to Electric cars

II. LITREATURE REVIEW

The majority of electric cars (EVs) in Europe are bought by private citizens of wealthy nations such as the Netherlands, Norway, Germany, the United Kingdom, France, and Sweden. Turkey's share of EVs is less than 1%, which is comparable to half of the member states of the EU. Another topic of concern for Turkish scholars has been the shift to electric cars from non-renewable energy sources. (Karamehmet & Morgul, 2018), demonstrated the factors that influence consumers' desire to use electric cars (EVs) as a characteristic of instrumental, ecological, social-representative, and political promotion (Ustabasx, 2015). The variables influencing €EV clients' buy and conduct goals. (O˙nder & Kaya, 2019), looked at how financial factors affected the sales of electric vehicles to customers in their 2019 study. They discovered that the country's oil prices, sustainable power age, and instructional fulfillment had less of an impact on EV deals than the urbanization border. (Yeg˘in & Ikram, 2022), examined the behaviors that impact the purchase intention of electric cars (EVs) by focusing on the social aspects related to the reception of EVs by Turkish customers. The study examined consumers who own automobiles with internal ignition systems. In a recent study, the effects of customer inventiveness, originality, and purchasing behavior on the intention of the consumer to buy electric vehicles and discovered that lifestyle influences purchase anticipation. The degree of centralization and originality in clients' desires to acquire domestic electric cars (EVs). These experts discovered that focused systems are a crucial component of promotion and that EVs should be developed while maintaining their operational qualities. (Karamehmet & Morgul, 2018), conducted a study in 2018 that focused on consumers' realistic perceptions of their propensity for electric vehicles. The evaluation produced recommendations for increasing the use of electric vehicles (EVs) and raising environmental consciousness in Turkey.

III. METHODOLOGY

A comprehensive study protocol will be implemented to investigate the factors influencing consumer protection from advancements in the Turkish electric car market. Initially, a thorough literature review will be conducted to identify current theories and frameworks related to consumer protection from development, with an emphasis on the automotive and electric vehicle industries. Important factors from previous studies that have been identified include perceived danger, lack of mindfulness, financial constraints, and social mindsets. Additionally, in order to collect quantitative data through planned research focusing on a particular Turkish consumer sector, vital information gathering using a mixed methods approach will be carried out in order to assess the attitudes, perceptions, and degrees of opposition towards electric automobiles. Contextual elements like Turkish government policies, foundation accessibility, and economic conditions will be taken into account in the evaluation. Through the integration of both objective and subjective findings, the analysis aims to provide a comprehensive understanding of the barriers to the adoption of electric vehicles and offer important recommendations for legislators and business partners to reduce consumer resistance. The sample population will comprise both anticipated buyers and those who have successfully resisted owning electric cars. Critical signs of shopper resistance will be identified by measurable inquiry, such as component and relapse evaluation.

The total population consists of approximately 385 of 459 interested locals on factors affecting consumer resistance to invocation in electric car industry in turkey. In addition almost 385 number of samples were selected out of 459, to test the result in the return of a floated questionnaire in sample population of 85300000. In this study, samples were recruited by implying the qualitative method technique.

We will interact with them through questionnaires so that information may be gathered. The data collection method will involve using closed-ended questionnaires, which participants in the study will be asked to fill out. The questionnaire will be designed using a five-point Likert scale that measures Strongly Agree, Agree, Neutral, Disagree, and Strongly Disagree. There are two sections to the questionnaire: the first asks questions concerning the personal details of the respondents, and the second part asks questions concerning the study constructs. The instrument was specifically chosen since it solicits the respondents' opinions and gives them the opportunity to draw on their experience to offer a range of facts.

IV. ANALYSIS

The study looks at the many aspects that lead to Turkish consumers' reluctance to embrace electric cars (EVs). Using a mixed-method approach that includes both qualitative interviews and quantitative surveys, the research reveals a range of hurdles, from psychological and infrastructural to technical and economic. Information was acquired from a broad group of prospective automobile purchasers in different parts of Turkey. The results show that substantial opposition still exists in spite of rising environmental consciousness and government incentives. The high initial cost of EVs, the lack of a suitable infrastructure for charging them, worries about battery life and maintenance, and a predilection for traditional internal combustion engine cars are some of the key barriers. The purpose of this study is to offer practical advice to manufacturers, politicians, and other interested parties so they may plan ahead and successfully promote the adoption of electric vehicles in Turkey.

A. Cronbach's Alpha

Tablo 1: Cronbach's Alpha for Constructs Related to Electric Cars

Construct	Cronbach's Alpha	Number of Items
Relative Advantage	0.872	5
Compatibility	0.856	5
Self-efficacy	0.841	4
Motivation	0.879	4
Expectations for better products	0.876	4
Attitude toward existing products	0.858	7
Perceived Risk	0.883	6
Complexity	0.859	4
Consumers' Resistance(dependent Variable)	0.926	11

Values above 0.7 indicate excellent internal consistency. The table employs Cronbach's Alpha to evaluate the dependability of numerous variables linked to consumer opposition to electric cars (EVs) in Turkey. A total of eleven constructs were assessed: Attitude Toward Existing Products (α=0.858), Perceived Risk (α=0.883), Relative Advantage (α=0.872), Compatibility (α=0.856), Self-efficacy (α=0.841), Motivation (α=0.879), Expectations for Better Products (α=0.876), and Complexity (α=0.859). Consumers' Resistance, the dependent variable, has the best dependability (α=0.926). These strong Alpha values imply that the survey items measure the targeted constructs successfully, offering a solid basis for comprehending and resolving the variables impacting Turkish consumers' reluctance to EVs. This knowledge can assist interested parties in creating plans to lessen opposition and encourage the adoption of EVs.

B. Factor Analysis

The adoption possibilities and constraints of electric cars are shown by the factor analysis of Turkish customers' views towards them. Since they fit in well with current lives and have several uses, an attractive design, usefulness, convenience, and an acceptable price-quality ratio, consumers view electric automobiles as favorable. Adoption is further aided by high self-efficacy and motivational growth, which are motivated by new features, professional value, and intrinsic delight. On the other hand, resistance is mostly caused by perceived hazards such data security, financial loss, durability issues, battery dependability, and expensive expenses, in addition to the difficulty of operating and comprehending electric cars. Reluctance is further made worse by perceptions about the present range of electric vehicles, including issues with multifunctionality and software administration. To promote greater acceptance and adoption of electric cars in Turkey, it is imperative to address these barriers by boosting consumer confidence, satisfying expectations for better features and affordability, streamlining the user experience, and reducing perceived risks with strong security measures and clear communication.

V. RESULT SUMMARY

Tablo 2: Results From SPSS

Factors	Hypothesis	Beta	T-Values	Significance	
Relative Advantage	H1	-0.076	-1.472	0.142	Rejected
Compatibility	H2	-0.064	-1.082	0.280	Rejected
Complexity	H3	+0.176	3.603	.001	Accepted
Perceived Risk	H4	+0.437	9.546	.001	Accepted
Expectation for Better Products	H5	-0.002	-0.055	0.957	Rejected
Motivation	H6	-0.063	-1.435	0.152	Rejected
Attitude towards existing products	H7	+0.385	9.109	.001	Accepted
Self-Efficacy	H8	+0.019	0.400	0.690	Rejected

The study looks at what variables influence Turkish customers' reluctance to electric automobiles and finds that the main causes of resistance are perceived danger, complexity, and favorable sentiments about traditional cars. Adoption is severely hampered by perceived dangers including price, functionality, and safety issues, as well as by the difficulty of comprehending and using electric vehicles. Resistance is further increased by a strong predilection for current automobiles. Resistance is not greatly influenced by other characteristics such as relative benefit, compatibility, anticipation for better products, drive, and self-efficacy. These results imply that encouraging the adoption of electric vehicles in Turkey will need a number of essential tactics, including tackling perceived hazards, streamlining the user experience, and undermining the desire for conventional automobiles.

VI. CONCLUSION

This research has several limitations, including a potentially non-representative sample size of the Turkish community, which may limit the generalizability of the findings. The reliance on self-reported data from surveys and interviews introduces potential bias, as participants may not accurately reflect their true intentions or behaviors. Additionally, the rapidly changing EV technology and market conditions mean that some conclusions may not remain valid over time. Future studies should use larger, more representative samples and longitudinal designs to track changes over time. Experimental investigations could confirm the causal links identified in this study, and incorporating real-world data on EV usage and infrastructure development would enhance the validity of future research.

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