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Estimating the Determinants of Consumers' Electric Vehicle Purchase Intentions: Empirical Evidence from Türkiye

Tüketicilerin Elektrikli Araç Satın Alma Niyetlerinin Belirleyicilerini Tahmin Etmek: Türkiye'den Ampirik Kanıtlar

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Abstract

In the present era, environmental concerns like air pollution, the decrease of natural resources (which has led to increased oil prices) and climate change have led to a shift in consumer preferences towards electric vehicles (EVs). The use of electric vehicles is regarded as an effective technology for reducing greenhouse gas emissions from road transportation using fossil fuels. Despite the recent influx of worldwide automotive brands into the Turkish market, the apportion of EV in the developing Turkish automobile market remains limited. It is crucial to identify the variables that influence consumers' intentions to purchase electric vehicles. The objective of this study is investigating the influence of environmental concern, environmental perception, social impact, performance and usage barriers on Turkish individuals' intentions to purchase EV. A survey was conducted online with 340 participants to test the research model and hypotheses derived from the literature. Once the data had been collected using the snowball sampling method, it was analyzed using the SPSS and SmartPLS software packages. The findings of the research indicate that consumers' environmental concerns and environmental perceptions have a significant effect on their purchasing intentions. On the other hand, while social influence and performance had a significant positive impact on the intention to purchase an EV, usage barriers did not have a significant impact.

Keywords: Electric Vehicles, Purchase Intention, Environmental Perception, Usage Barriers, Performance, Social Influence.

Öz

Günümüzde hava kirliliği, doğal kaynakların tükenmesi (petrol fiyatlarının artmasıyla sonuçlanan) ve iklim değişikliği gibi çevresel sorunlar, tüketiciler arasında elektrikli araçların tercih edilmesine yol açmıştır. Elektrikli araçlar, fosil yakıtların kullanıldığı karayolu taşımacılığından kaynaklanan sera gazı emisyonlarını azaltan etkili bir teknoloji olarak kabul edilmektedir. Türkiye'de son dönemde birçok küresel marka otomobil pazarına girmiş olsa da, elektrikli araçların gelişmekte olan Türk otomobil pazarındaki payı sınırlı kalmaktadır. Bu nedenle, tüketicilerin elektrikli araç satın alma niyetlerini etkileyen faktörlerin belirlenmesi önemlidir. Bu çalışmanın amacı, çevresel kaygı, çevresel algı, sosyal etki, performans ve kullanım engellerinin Türk tüketicilerin elektrikli araçlara yönelik satın alma niyetleri üzerindeki etkisini araştırmaktır. Araştırma modelini ve literatüre dayalı hipotezleri test etmek için 340 katılımcı ile çevrimiçi bir anket gerçekleştirilmiştir. Veriler kartopu örnekleme yöntemi ile toplandıktan sonra SPSS ve SmartPLS paket programları kullanılarak analiz edilmiştir. Araştırma bulguları, tüketicilerin çevresel kaygıları ile çevresel algılarının satın alma niyeti üzerinde önemli etkisi olduğunu doğrulamaktadır. Öte yandan elektrikli araç satın alma niyeti üzerinde sosyal etki ve performans anlamlı ve pozitif etkiye sahipken, kullanım engellerinin önemli bir etkisi olmadığı görülmüştür.

Anahtar Kelimeler: Elektrikli Araçlar, Satın Alma Niyeti, Çevresel Algı, Kullanım Engelleri, Performans, Sosyal Etki.

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Estimating the Determinants of Consumers' Electric Vehicle Purchase Intentions: Empirical Evidence from Türkiye

Due to the increasing population and subsequent rise in production in the industrial and conveyance sectors, the consumption of natural gas and oil has reached its peak level. The combustion of fossil fuels, such as coal, oil, and natural gas, to fuel vehicles and machinery has significantly increased CO2 emissions, also known as greenhouse gas (GHG) emissions (Abbasi et al., 2021). In terms of the International Energy Agency (IEA), the majority of GHG emissions in the Turkish energy market are attributable to the use of petroleum-based petrol and diesel motor vehicles. Furthermore, the transport sector, including road transport, was identified as the second most significant source of GHG emissions, accounting for 22.3%. Turkey ranked thirteenth globally and second in Europe for GHG emissions resulting from fossil fuel energy production (International Energy Agency, 2022). On the other hand, based on Anadolu Agency (AA) data, the Turkish automotive market (including cars and light commercial vehicles) grew by approximately 60% in 2023 compared to the previous year, with a significant portion of the market being comprised of vehicles with internal combustion engines. This growth rate is noteworthy, especially considering the chip supply shortage and high inflation environment in the post-Covid period (Durdak, 2024). The figures demonstrate that the transport sector, particularly road transport, has a negative impact on the environment, contributing to issues like air pollution, climate change and global warming (Lee et al., 2021; Lin et al., 2017). The widespread use of electric vehicles, characterized as sustainable cars, may be beneficial in reducing GHG emissions, a common source of environmental problems not only in Turkey but also in all countries of the world (Hofmann et al., 2016; Krishnan & Sreekumar, 2023).

Turkey has the potential to become a significant player in the electric vehicle market due to its high car sales volume, significant contribution to GHG emissions, and dependence on imported oil. Many global brands have recognized this potential and actively promote their products in the country. According to the Automotive Distributors and Mobility Association (ODMD), EV sales raised by 844% in proportion to the previous year in 2023. Despite the striking rate, electric vehicles only account for 7.5% of total car sales in Turkey in 2023. Hybrid vehicles have a share of 10.8% (Durdak, 2024). Due to infrastructure problems, limited government support, a general rise in electricity prices (Güven, 1999), doubts about performance, and other negative factors (Ninh, 2021), the low rate of electric vehicle use is a predictable situation. In this context, it is important to examine the factors that impact consumers' electric vehicle purchasing behavior to develop strategies that increase the market apportion of electric vehicles. However, few studies center on the barriers to the use of EV in the developing Turkish market and the factors that contribute to their widespread use (Kocagöz & İğde, 2022; Yaprak et al., 2024; Efendioğlu, 2024). The present research has been motivated by these factors and highlights the need for further investigation. This study provides insights that will aid in the wider adoption of EV.

The Turkish government has presented a grant program to support the use of EV. This initiative involves the installation of charging stations and a decrease in special consumption tax (SCT) based on engine power and sales price. However, despite these efforts, the acceptance EVs remains low. This suggests that factors beyond government policies may be of significant influence on the decision to purchasing an EV. The study predicts that consumers' purchase intentions may be influenced by several factors, including concern about environmental damage caused by fossil-fuelled vehicles, the perception that electric vehicles are environmentally friendly, the performance of electric vehicles, other people's opinions about electric vehicles, and technical barriers to their use. The study proposes a model that considers factors affecting the intention to purchase an EV, such as environmental concern, environmental perception, performance, social impact, and usage barriers.

The study is structured as follows: Following the introduction, the conceptual framework is introduced,

followed by a literature look at the hypotheses developed in line with the research model. The method section includes details about the scale creation, data collection, and presentation of information about the sample. Information about the methods used in data analysis is then provided, and the findings of the analysis are summarized. In conclusion, the research findings are associated with those of previous studies in literature. Recommendations are made for manufacturers and government officials to develop effective strategies for the widespread use of EVs. The study reasoned out research limitations and recommendations for future research.

Conceptual Framework and Hypothesis Development

Electric Vehicles (EVs)

The use of fossil fuels in industrial and automotive sectors has been connected to increased air pollution and serious health issues, including cancer. Additionally, the transportation sector devours nearly half of the world's oil supply. Given the current rate of consumption, it is predicted that this non-renewable resource will be depleted by 2038 (Ding et al., 2017, p. 50). The necessity to address these issues has prompted automotive manufacturers to develop their technologies accordingly. Electric vehicle technologies are a crucial aspect of the development process. Currently, the automotive industry invests a significant portion of its research and development budget towards creating engine technology that is environmentally friendly and reduces reliance on fossil fuels (Veza et al., 2023). The latest technology has led to the development of five categories of EVs: battery electric vehicles (BEV), plug-in hybrid electric vehicles (PHEV), hybrid electric vehicles (HEV), fuel cell electric vehicles (FCEV), and extended-range electric vehicles (ER-EV) (Sanguesav et al., 2021, p. 376). BEVs operate solely on electric power, while PHEVs are powered by both an internal combustion engine and an externally stored electric motor. HEVs generate electricity internally using an electric motor instead of storing it externally. The electric motor is powered by the vehicle battery, while the internal combustion engine recharges the battery. FCEVs are vehicles that use an electric motor powered by compressed oxygen and hydrogen. This technology produces zero emissions, reducing air pollution. However, it does increase the consumption of natural resources as natural gas is used to produce hydrogen. ER-EVs, then again, have an internal combustion engine that generates energy for the battery. Unlike the other types of vehicles mentioned, this engine is not powered by the wheels of the vehicle and is used solely for charging purposes (Sanguesav et al., 2021, p. 377).

Despite recent developments in the electric vehicle industry, their use remains limited worldwide due to concerns about technical features such as limited driving range (Miwa et al., 2017), recharge time (Hardman et al., 2016), battery durability (Junquera et al., 2016), maximum speed, and performance (Lee et al., 2021). Furthermore, economic factors such as price (Zhuge & Shao, 2019) and long-term monetary benefits (Lashari et al., 2021), as well as infrastructure problems such as limited charging stations (Habich-Sobiegalla et al., 2018), play a decisive role in consumer purchasing decisions. Overcoming technological deficiencies and addressing consumer concerns are key to expanding the EV market. A recent literature review has identified numerous factors that directly impact consumers' intentions to purchase electric vehicles (Ivanova & Moreira, 2023, p. 8). The literature review categories the ascendants of EV purchase intention into three main categories, each with three sub-categories, resulting in a total of nine sub-categories. Based on this literature review, the current study considers five determinants, namely environmental concern, environmental perception, social impact, usage barriers, and performance, which are considered to impact Turkish consumers' EV purchase intentions. The literature review on the hypotheses developed in line with these determinants is presented in the following section.

Environmental Concerns

Environmental concern refers to the consciousness of environmental problems and the advocacy of solutions to these problems. It involves a willingness to seek solutions to these problems personally (Dunlap & Jones, 2002, p. 485). As an individual belief, environmental concern can guide consumers' decisions to purchase sustainable products (Dutta & Hwang, 2021, p. 4). Jensen et al. (2013) conducted a research supporting the idea that consumers with high environmental concern prefer electric vehicles. The study found that consumers' electric vehicle preferences were positively influenced by environmental concern both before and after a three-month test drive experience. Additionally, a study conducted in the densely populated Macau region of China confirmed that environmental concern is a key factor motivating consumer interest in EVs (Lai et al., 2015). Another study conducted with the example of Pakistan revealed that environmental concerns have a significant effect on the intention to purchase EVs. Additionally, consumers with high environmental concerns have been reported to be more likely to purchase EVs (Lee et al., 2021). Growing environmental concern encourages individuals to take greater responsibility for protecting the environment, and this has a significant effect on their decision to purchase EV (Cui et al., 2021). Habich-Sobiegalla (2018) and colleagues conducted an international comprehensive study on Brazilian, Chinese, and Russian citizens to provide sustainable solutions for transportation. The research established that environmental concern strongly influenced the intention to purchase EVs in all three countries, with the highest impact observed among Brazilian citizens. Wu et al. (2019) examined the factors that affect the acceptance of autonomous EVs (driverless and robotic), within the framework of the technology acceptance model. The research found that high levels of environmental awareness encourage consumers' behavioral intentions. However, a study conducted in Hong Kong found results that contradict the earlier studies. The intention to purchase EV was not determined by environmental concerns (Ng et al., 2018). Many subsequent studies have reached similar conclusions (Ackaah et al., 2022; Ninh, 2021). The discrepancy in the literature can be defined by the fact that environmental concern is a psychological factor that may vary different cultural structures. In this context, the following hypothesis is proposed to understand more clearly whether Turkish consumers' environmental concerns determine their intention to purchase EVs.

H1: Environmental concern positively influences consumers' intention to purchase EV.

Environmental Perception

In the scope of this study, the concept of environmental perception reflects the benefits of EVs for environmental guardianship. Benefit expectation is a significant factor affecting purchase intention (Wang, 2017). Several studies have emphasized that electric vehicle use reduces the effects of climate change, carbon footprint, and natural resource consumption, and that environmental protective behavior is linked to the expectation of environmental benefits (He et al., 2018; Jansson et al., 2010). Consistent with He et al. (2018), environmental perception is consumers' appreciation of the positive environmental consequences of using EVs. Electric vehicles have two main environmental benefits: energy saving and environmentally friendly features. Environmental perception reflects awareness of these benefits (Xu et al. 2019). Electric vehicles contribute more to the efficient use of energy than internal combustion engine vehicles. Especially when electricity is developed with renewable energy resources, these vehicles offer more environmental benefits than vehicles that use petroleum-based fuel (Zhang et al., 2022). On the authority of Zhang et al. (2018), today consumers are aware of the environmental advantages of EVs. This awareness may lead to positive attitudes towards the use of EVs. Another study of German consumers found that the environmental performance of electric vehicles had a stronger effect on attitudes and purchase intentions than price value and line up assurance (Degirmenci & Breitner, 2017). Thus, the following hypothesis was proposed.

H2: Environmental perception positively affects consumers' intention to purchase EV.

Social Influence

Fishbein and Ajzen, in the Theory of Reasoned Action (TRA), it has been suggested that the intention to purchase may be affected by the social influence or pressure of other people. The authors initially explained this effect using the concept of subjective norm, which mentions a person's appreciation of whether important people in their life think he/she should or should not engage in a particular behavior (Fishbein & Ajzen, 1975, p. 302). Subsequently, Venkatesh et al. (2003, p. 405) determined as social influence as the extent to which an individual believes that significant people life expect them to use the new technology. Cui et al. (2021) emphasized the emphasis of peer recommendations in individuals' purchasing decisions, citing the need for affiliation in Maslow's Hierarchy of Needs in their research. They also found that social influence plays a crucial role in motivating people to buy electric vehicles. All these studies show that social influence occurs when an individual's behavior is influenced by others (Lin & Wu, 2018, p. 234). A study conducted in India found that the perspectives of people in the participants' communication networks had a positive effect on their intention to purchase EVs (Krishnan & Koshy, 2021). The opinions of various reference groups, such as family members, neighbors, peers, or friends, have the power to change an individual's opinion about purchasing an EV (Zhang et al., 2011). The study on Taiwanese consumers supports this view. According to the study, potential consumers are highly influenced by the opinions of their close friends who have already purchased electric vehicles and are satisfied with them (Dutta & Hwang, 2021). A study carried out in Beijing, the capital of the People's Republic of China, revealed that 64 percent of vehicle owners are considering buying an EV. This is due to the positive evaluations of electric vehicle users, including their relatives and friends (Yang & Tan, 2019, p. 14). Kim et al. (2014), marketing strategies prepared according to the details of social impacts can accelerate the positive change in attitudes and therefore intentions towards electric cars. However, some studies in the literature suggest that social influence may not importantly impact the intention to purchase EVs (Lashari et al., 2021; Lee et al., 2021). These conflicting results point out that the impact of social influence on EV purchase intention may vary depending on the study sample or country (Nosi et al., 2017). Therefore, the following hypothesis is proposed to understand the influence of social influence on the purchasing intentions of Turkish consumers for electric vehicles.

H3: Social influence positively influences consumers' intention to purchase EV.

Usage Barriers

Numerous international studies have examined the challenges to the widespread adoption of EVs in various countries. For example, Vassileva and Campillo (2017), Tarei et al. (2021), and Asadi et al. (2022) have conducted research on this topic. Adhikari et al. (2020) have investigated the obstructions of electric vehicle use in Nepal using multi-criteria decision-making methods. The research findings indicate that infrastructure barriers were the most significant, followed by political, economic, technical, and social barriers, respectively. Additionally, the weights of all categories, except for social barriers, were similar, highlighting the importance of these three categories in the use of electric vehicles. After analyzing the categorical barriers in detail, it was found that the most significant infrastructure barrier was the lack of charging stations, followed by the deficiency of reparation and upkeep services. The most significant technical barriers were limited range and battery life, respectively. Krishnan and Koshy's (2021) study on Indian consumers' electric vehicle adoption behavior found that concerns such as battery life, duration, and cost had a negative impact on purchase intention. Haustein et al. (2021) carried out a multinational research as part of an EU project and discovered that new fast charging stations had a positive effect on the intention to purchase EVs in Denmark. However, this effect was not observed in the Swedish context. The authors attribute this result to Sweden's more advanced

electric vehicle infrastructure investments compared to Denmark. A recent literature review categorized the factors preventing Indian consumers from adopting electric vehicles into thirteen categories. The study identified the deficiency of a uniform charging infrastructure, recharging time, and driving range as the three most important barriers (Patyal et al., 2021). On the other hand, while pre-sales and after-sales services play a significant role in the electric vehicle purchase intentions of Italian millennial consumers, the opposite of what was expected in terms of perceived barriers was realized (Nosi et al., 2017). Other studies in the literature have also found that obstacles such as driving range (Shareeda et al., 2021), battery life (Habich-Sobiegalla et al., 2018), and charging time (Miwa et al., 2017) do not affect purchase intention. This research proposes the following hypothesis to determine how these barriers influence the intention of Turkish consumers to purchase EVs, taking into account that barriers to use may vary by geographic location.

H4: Usage barriers negatively influence consumers' intention to purchase EV.

Performance

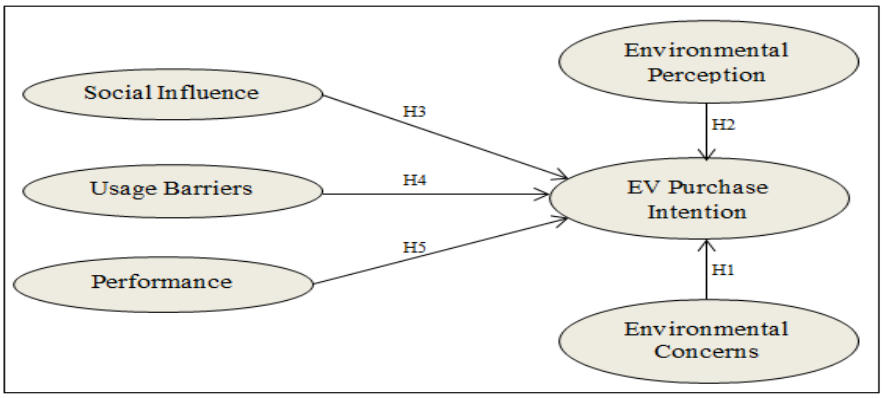
Performance is defined as the belief of consumers that electric vehicle engines are technically competitive with internal combustion engines (Krishnan & Sreekumar, 2023, p. 165). Krishnan and Sreekumar (2023) also stated that electric vehicles with comparable performance characteristics to conventional vehicles, such as speed, power, acceleration, and torque, are more likely to be adopted. The competitive performance characteristics of EVs can be a powerful strategy even for consumers who do not prioritize environmental friendliness (Kang & Park, 2011). Furthermore, the greater the relative advantage of EVs associates to conventional vehicles, the higher the likelihood of consumer adoption. Therefore, it is possible to positively influence the intention to adopt EVs through driving experiences that allow for the evaluation of performance characteristics (Xu et al., 2020). Lee et al. (2021) reported that performance expectancy has a positive impact on behavioral intentions to purchase EVs. Abbasi et al. (2021) reported results that contradicted the study findings of Lee et al. (2021). In a study carried out a sample of individuals with knowledge and experience in technological products, the participants stated that they would be more likely to adopt EVs if they sense them to be superior in performance associated with customary vehicles (Egbue & Long, 2012). According to a study on hybrid vehicle technology, factors such as quiet operation, environmental friendliness, quality, efficiency, automatic transmission, and ease of driving play a significant role in the adoption of these vehicles (Ozaki & Sevastyanova, 2011). A similar study conducted in Beijing, it was reported that electric vehicle product features are among the main factors affecting purchase intention (Huang & Ge, 2019). Another study defined the quality of electric vehicles as a performance value for consumers. The study revealed that performance value has a positive impact on attitude and adoption intention (Han et al., 2017). According to Tu and Yang (2019), vehicle performance is one of the main factors affecting the intention to purchase an EV. On the other hand, according to Dutta & Hwang's (2021) research, vehicle performance did not affect attitude, which is the main determinant of behavioral intention, among participants in Thailand. The researchers explained this by saying that participants generally purchased electric vehicles for daily use and were not concerned about vehicle performance for short distance drives. Another study conducted in four major Chinese cities has reached similar conclusions. According to the results, the average score for the vehicle performance statements was close to three. This suggests that respondents believe that electric vehicles do not have a clear advantage over internal combustion engine vehicles (Lin & Wu, 2018). This research proposes the following hypothesis that the performance of EVs is a factor in purchase intention for Turkish consumers, as reported in many other studies with positive results.

H5: Performance positively influences consumers' intention to purchase EV.

The research model and hypothesis paths based on the above discussions are presented in Figure 1.

Figure 1

Research Model



The following part shows details of the survey application used to test the effect of environmental concern, environmental perception, social influence, usage barriers and performance variables on electric vehicle purchase intention.

Data and Methodology

Measurements

Scales validated in previous studies were utilized to test the hypothesis pathways, as shown in Figure 1. Environmental concern was assessed with a five-item scale including the context of "concern about air and environmental pollution from exhaust emissions" and adapted from Lee et al. (2021). The environmental perception was menstruated by getting participants' degree of agreement with five expressions meaning that "the use of electric vehicles reduces environmental damages" and was adapted from He et al. (2018). Social influence was measured by four statements that identified "the level of influence of family and peers on electric vehicles" and adapted from Abbasi et al. (2021). Usage barriers were measured with five statements contextualizing 'concerns about range, charging and servicing'. Three of the statements were adapted from Krishnan and Sreekumar, (2023) and two from Abbasi et al., (2021). Performance was tested with a three-point scale that includes "the competitive qualities of electric vehicles with conventional vehicles". The statements were selected from Krishnan and Sreekumar (2023) and Xu et al. (2020). Finally, five statements from Ninh (2021) were used to measure purchase intention in the context of "I plan to purchase an EV if conditions are favorable". The final survey, consisting of 27 statements, was evaluated using a 5-option Likert scale from 1 to 5 (strongly disagree....strongly agree). The questionnaire was separated two part. The first section included sociodemographic details, like gender, age, education, occupation, income, EV driving experience, and car ownership. The second part consisted of statements related to the determinants of EV purchase intention. Prior to conducting absolute analyses, pre-research was conducted pre-test the data. The researcher personally identified individuals with knowledge about electric vehicles and forwarded them the URL of a questionnaire prepared through Google Forms. The purpose was to obtain feedback on the clarity and suitability of the questions for the research. Based on the feedback transmitted, some questions were rephrased. The pilot study yielded a Cronbach's alpha above 0.70 based on 48 responses. The explanatory factor analysis, conducted using the SPSS, grouped statements with a factor load of 0.50 and above according to their respective factors.

Data Collection and Sampling

Turkey has a small but growing market share in the electric car category (Durdak, 2024). Furthermore, the increasing air pollution throughout the country, especially in the Marmara region has led to a rise in awareness about electric vehicles (IEA, 2022). This study is a cross-sectional research using quantitative research techniques. To examine the purchase intentions of Turkish consumers for electric vehicles, a nationwide online survey was conducted from 10-26 March 2024. In order to reach potential participants, it was determined that the exponential non-discriminative snowball sampling method was an appropriate approach. This method is one of the non-probability sampling methods (Etikan et al., 2015). The participants are individuals who know about electric vehicles. To achieve objectivity, the researcher contacted individuals believed to have information on the subject via WhatsApp. The initial contact group was then asked to reach out to others who had information on electric vehicles using the same method. This process was continued until the sufficient sample size was reached. A total of 340 surveys were obtained, taking into account 5% sampling error and 95% confidence level. Table 1 displays the demographic qualities of the participants.

Table 1

Demographic Gualities of the Research Participants

Measure	Item	Count	(%)
Gender	Female	157	46.2
	Male	183	53.8
Age	18-29	77	22.6
	30-39	145	42.6
	40-49	84	24.7
	≥50	34	10.0
Education	High school and below	26	7.6
	Associate degree	22	6.5
	Bachelor's degree	167	49.1
	Master's degree	76	22.4
	Ph.D. degree	49	14.4
Monthly Income (As of March 2024, 1₺ is approximately equal to 0.031 USD.)	≤17.000 ₺	32	9.4
	17.001 ₺ -27.000 ₺	43	12.6
	27.001 ₺ -37.000 ₺	40	11.8
	37.001 ₺ -47.000 ₺	63	18.5
	≥47.001 ₺	162	47.6
Occupation	Government employee	181	53.2
	Private employee	89	26.2
	Self-employed	24	7.1
	Retired	7	2.1
	Unemployed	39	11.5
Car Ownership	No car	91	26.8
	1 car	190	55.9
	2 cars and more	59	17.4
Electric Vehicle Driving Experience	Yes	81	23.8
	No	259	76.2

The gender distribution of the participants was balanced, with 53.8% male and 46.2% female, in line with the address-based population registration system (TÜİK, 2023). Analysis of the age distribution shows that 67.3% of participants are aged between 30-49, with 10.0% aged 50 or older. Regarding

education, 85.9% of the participants hold a bachelor's degree or higher, while 6.5% have an associate's degree. The remaining 7.6% have a high school education or less. The proportion of participants with an income above ₺37,000 was 66.1%. Upon analyzing the occupations of the participants, it was found that the majority (79.4%) are employed in the government and private sectors. The percentage of individuals who own at least one car is significantly higher (73.3%) compared to those who do not (23.8%). Furthermore, only a minority of respondents (24.4%) reported prior experience with electric vehicles.

Data Analysis and Findings

The collected data was analyzed using SPSS and SmartPLS software. Firstly, the reliability of the main scale with 27 statements and the sub-dimensions in the scale were tested via SPSS. The Cronbach's Alpha value of the main scale was found to be 0.926, while the Cronbach's Alpha values of the sub-dimensions were between 0.775 and 0.946. All values exceeded the recommended values (Hair et al., 2009), indicating high reliability of the scale. Following the reliability analysis, we conducted an exploratory factor analysis using the principal axis factorization and varimax rotation method to determine if the statements in the scale were collected under the structures verified in the literature. The analysis yielded a KMO value of 0.924 and a Chi-Square value of 6551.026 (sd: 351 sig. < 0.001) as a result of Bartlett's test. All statements had factor loadings greater than 0.50. Additionally, all statements were categorized according to their related constructs. Finally, six constructs with eigenvalues greater than 1 were identified, explaining a total variance of 72%. These results demonstrate that the sample size is adequate and that the relationships between the constructs and their sub-expressions are significant (Krishnan & Koshy, 2021). In other words, the results confirm that the dataset is suitable for confirmatory factor analysis and PLS-SEM.

Measurement Model

To test the measurement model, confirmatory factor analysis was conducted using the SmartPLS program. In the analyses, the construct reliability and validity (convergent and discriminant validity) of the measurement model were evaluated with a bootstrapping sample of 5000 people. However, prior to conducting the analysis, it is necessary to examine the nature of the structures in the model in order to determine the most appropriate methodology for the basic analysis. Given that all structures in the model reflect the contents of the sub-expressions (Juliandi, 2018, p. 3), the model was determined to be reflective. Consequently, the measurement and structural models were analyzed using consistent PLS-SEM (Dash & Paul, 2021). In the process of evaluating the measurement model, the factor loadings of the sub-expressions of the structures were initially examined. Hair et al. (2017, p. 137) propose that statements with factor loadings below 0.40 should be removed from the scale. On the other hand, expressions with factor loadings between 0.40 and 0.70 should remain in the scale if they meet the conditions of average variance extracted (AVE)>0.50 and composite reliability (CR)>0.70. Table 2 reveals that the factor loadings of the expressions EC4 (0.586), SI1 (0.697), UB1 (0.633) and UB2 (0.617) fall within the range of 0.40-0.70. Upon examination of the AVE and CR values presented in Table 2, it can be seen that the relevant expressions were retained within the scale, as they exhibited values above the desired threshold. The internal consistency of the data was evaluated by examining Cronbach's Alpha and CR values. The Cronbach's Alpha values of the constructs were found to be in the range of 0.775-0.947, while the CR values were in the range of 0.853-0.960 (see Table 2). It was observed that the AVE values were above the reference value of 0.50. In accordance with the criteria set forth by Fornell & Larcker (1981) and Hair et al. (2017), it can be stated that the measurement model meets the internal consistency and convergent validity criteria.

Table 2

Assessment of Measurement Model

Construct	Sub-Expressions*	Factor Load	Cronbach Alpha	rho_A	CR	AVE
Environmental Concerns	EC1	0.769	0.834	0.903	0.879	0.596
	EC2	0.818				
	EC3	0.820				
	EC4	0.586				
	EC5	0.838				
Environmental Perception	EP1	0.943	0.947	0.959	0.960	0.828
	EP2	0.917				
	EP3	0.950				
	EP4	0.953				
	EP5	0.775				
Social Influence	SI1	0.697	0.775	0.811	0.853	0.594
	SI2	0.836				
	SI3	0.777				
	SI4	0.776				
Usage Barriers	UB1	0.633	0.853	0.744	0.860	0.557
	UB2	0.617				
	UB3	0.712				
	UB4	0.855				
	UB5	0.876				
Performance	P1	0.843	0.779	0.788	0.869	0.690
	P2	0.849				
	P3	0.798				
EV Purchase Intention	PI1	0.905	0.919	0.922	0.939	0.757
	PI2	0.900				
	PI3	0.897				
	PI4	0.849				
	PI5	0.793				

*Note:*t* values of all expressions>2.32 and p<0.001

Table 3 presents the results regarding discriminant validity. A substantial body of literature examines the concept of discriminant validity using the Fornell & Larcker (1981) method and Henseler et al. (2015) HTMT values. In accordance with the Fornell & Larcker method, the black root of AVE must be greater than the correlation between structures. The HTMT values proposed by Henseler et al. (2015) were found to be above 0.90 in the measurement model containing similar structures. Conversely, in the measurement model containing different structures, it is expected that the HTMT values will be below 0.80. In Table 3, values in bold indicate the square root of AVE, values in parentheses indicate correlation coefficients, and italicized values indicate HTMT values. Upon examination of Table 3, it can be seen that the measurement model meets the reference values and has discriminant validity. Finally, the VIF coefficients of the constructs were examined, and it was found that they ranged from 1.05 to 2.81. Hair et al. (2019, p. 10) state that VIF values below 5 indicate that multi-collinearity is not a concern in model.

Table 3

Fornell & Larcker Method and HTMT Values

Construct	Environmental Concerns	Environmental Perception	Social Influence	Usage Barriers	Performance	EV Purchase Intention
Environmental Concerns	**0.772**					
Environmental Perception	*0.838* (0.770)	**0,910**				
Social Influence	*0.567* (0.480)	*0.576* (0.504)	**0.771**			
Usage Barriers	*0.167* (0.082)	*0.037* (0.008)	*0.129* (0.026)	**0.747**		
Performance	*0.592* (0.493)	*0.573* (0.521)	*0.740* (0.577)	*0.248* (0.154)	**0.830**	
EV Purchase Intention	*0.639* (0.610)	*0.701* (0.658)	*0.599* (0.523)	*0.085* (-0.049)	*0.564* (0.491)	**0.870**

Following the validation of the measurement model, a series of detailed analyses were conducted using the SmartPLS program to test the significance of the hypothesis paths within the research model. The results of these analyses are presented in the subsequent section.

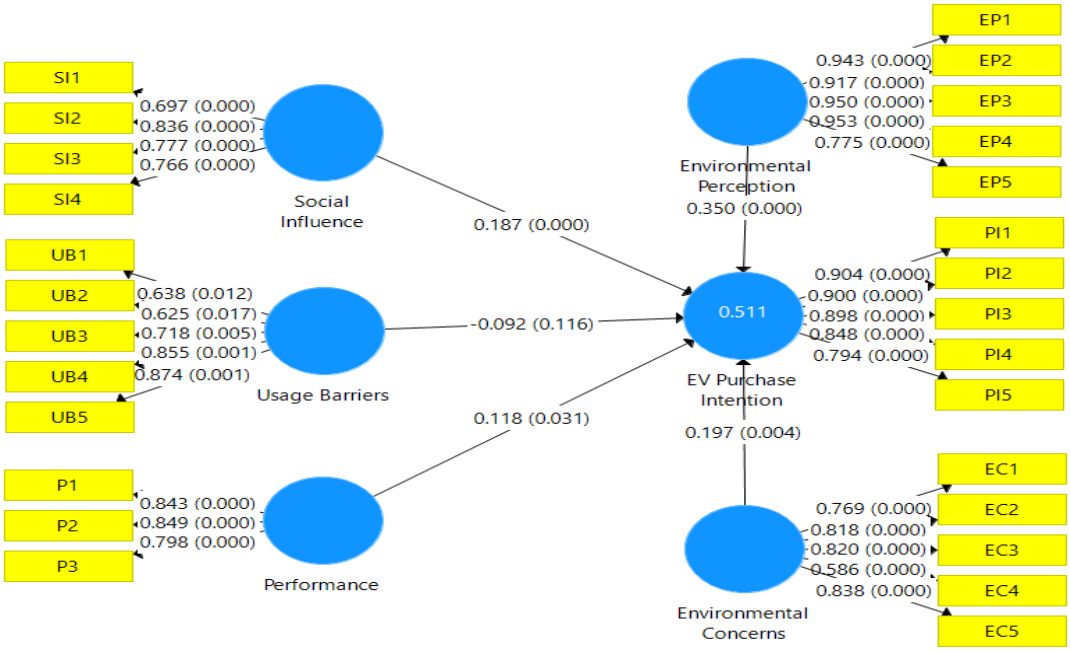
Structural Model

The results of the structural model testing the research hypotheses are presented in Figure 2. The hypothesized paths were evaluated in the PLS-SEM algorithm with a significance level of 5% and 5000 bootstraps. Figure 2 presents the standardized path coefficients of the hypothesized paths, their respective significance levels (shown in parentheses), and the explained variance of the dependent variable (R^2). Upon examination of Figure 2, it becomes evident that the R^2 value of the dependent variable (EV purchase intention) is 0.51. The R^2 value, which reflects the total variance explained, indicates that 51% of the independent variables predict EV purchase intention. Consistent with Hair et al. (2011:147), R^2 values above 0.50 are considered important in evaluating the quality of the tested model. The PLSPredict analysis yielded a Q^2 value of 0.36. Q^2 value of 0.35 or above is indicative of a high degree of predictive ability (Hair et al., 2014). In order to ascertain the proportion of independent variables in the R^2 percentage of the dependent variable, Cohen's (1988) effect size coefficient, f^2 values, were examined. The evaluation conducted in accordance with the reference ranges established by Cohen (1988) revealed that all of the independent variables exhibited a relatively weak influence on EV purchasing intention, with f^2 values ranging from 0.030 to 0.089.

The hypothesized paths can be tested following satisfactory results of the structural model. Upon evaluation of the significance of the research hypotheses, it is observed that all hypotheses, with the exception of H4, positively influence the EV purchasing intention (Figure 2). Among the independent variables, the environmental perception variable was found to significantly affect the EV purchasing intention (β= 0.350, $p<0.001$). This indicates that the H2 hypothesis is supported, and that environmentally friendly features of electric vehicles are a significant factor in Turkish consumers' intention to purchase EVs. Consistent with the H2 hypothesis, the path from the environmental concern variable to EV purchase intention was found to be significant (β= 0.197, $p<0.01$). This indicates that hypothesis H1 is accepted, and individuals with environmental concerns have a higher intention to purchase EVs.

Figure 2

Path Diagram



The path from the social impact variable to EV purchase intention had a significant coefficient (β= 0.187, p<0.001). The findings indicate that the opinions of family and friends regarding electric vehicles have a positive impact on the intention to purchase an electric vehicle. Consequently, the H3 hypothesis was accepted. The performance of electric vehicles was found to have a positive effect on purchase intention (β= 0.118, p<0.05). The fact that electric vehicles have a performance that can compete with traditional vehicles demonstrates that individuals have increased purchasing possibilities. Conversely, while it was anticipated that usage barriers would have a negative impact on the intention to purchase EVs, the results were not statistically significant for this study (β= -0.092, p>0.05). Consequently, the H4 hypothesis was not corroborated. A mere 24% of the participants had prior experience with electric vehicles. Therefore, general opinions regarding usage barriers may not play a decisive role in purchase intentions.

Discussion and Implications

The objective of this research was to identify the factors influencing individuals' intention to purchase EVs in an emerging market. The findings of the research indicate that Turkish consumers are concerned about the environment and that the environmentally friendly features of electric vehicles influence their motivation for purchasing vehicles. This finding is consistent with the results of a study on Pakistani consumers struggling with air pollution (Lee et al., 2021). The findings of the current study, which supports previous research investigating the factors influencing EV purchase intention, indicate that both environmental concern (Abbasi et al., 2021; Habich-Sobiegalla et al., 2018; Haustein et al., 2021; Lin & Wu, 2018) and environmental perception (He et al., 2018; Jansson et al., 2010) have a positive effect on EV purchase intention. The environmentally protective features of EV, including the reduction of climate change, carbon footprint, environmental pollution, and natural resource consumption, have been identified as key motivators for consumers in their purchasing decisions (Xu et al., 2019). In this context, marketing approaches that emphasize the positive impact of EVs on environmental protection and resource conservation may have a positive effect on Turkish consumers' EV purchases.

A further research finding indicates that individuals' EV purchasing intentions are influenced by close reference groups, such as family and friends. This finding supports the study of Dutta and Hwang (2021), which emphasized that social pressure from other individuals in close proximity to consumers can alter consumers' purchasing intentions in favor of sustainable EVs. A further study indicated that the perspectives of people in an individual's communication network can significantly influence his/her behaviour and tool choices (Krishnan & Koshy, 2021). A three-country comparative study, in line with the current research, has determined that personal dialogues and having a relative (such as a peer or family member) who owns an electric vehicle is a significant factor in the decision to purchase (Habich-Sobiegalla et al., 2018). In Turkey, where the influence of the group on the individual is pervasive, it can be reasonably asserted that the actions and behaviors of consumers are shaped by the opinions of individuals with whom they are closely associated. Consequently, in the Turkish market, EV manufacturers and marketing managers can facilitate greater knowledge and awareness of EVs by promoting their vehicles in public places such as shopping malls and offering complimentary test drives. Furthermore, the implementation of marketing strategies that encompass not only individual users but also the audience in the immediate vicinity of potential customers can enhance the impact of social influence on intention. It may be beneficial to leverage the marketing potential of social media platforms, such as YouTube, Instagram, and X, which are instrumental in the digital age.

Existing research has revealed that electric vehicles' performance features that compete with conventional vehicles positively influence EV purchase intention. The study, which was conducted in four major Chinese cities, found that the performance of electric vehicles (EVs) had a positive effect on the desire to purchase them. Furthermore, the study revealed that EVs perform as well as fossil fuel vehicles (Lin & Wu, 2018). Zhang et al. (2018) found in their study that consumers who prioritize the performance of electric vehicles (EVs) are more likely to purchase EVs. Another study showed that vehicle performance is an important factor in influencing consumer purchasing decisions. They therefore encouraged EV manufacturers to invest more in research and development to make their products more affordable, faster and more powerful than conventional vehicles (Krishnan & Koshy, 2021). In accordance with the findings of Krishnan and Sreekumar (2023), it can be posited that consumers who perceive EVs to be highly performing are more likely to purchase them. Consequently, informative advertisements and test drives may be an effective means of dispelling the public's doubts about performance.

The results of this study indicate that the perceived barriers to the use of EVs do not significantly affect EV purchase intention. This finding differs from previous studies that have suggested that limited driving range (Miwa et al., 2017), insufficient charging stations (Habich-Sobiegalla et al., 2018), recharging time (Junquera et al., 2016), and improvements in after-sales repair and service (Krishnan & Koshy, 2021) have a positive impact on EV purchasing intention. However, it is consistent with the results of the study (Nosi et al., 2017), which suggests that the usage barriers related to EVs do not affect the decision-making period of the Y generation. Similarly, Shareeda et al. (2021) also reported that driving range did not have a significant impact on consumers' willingness to purchase EV in Bahrain. The limited share of electric vehicles in the Turkish market and lack of knowledge about obstacles may have made it difficult for participants to make evaluations regarding their use. In this context, joint marketing initiatives can be established with individuals who are regarded as opinion leaders (such as influencers, celebrities, and experts) with the objective of reducing public prejudice and uncertainty surrounding electric vehicles.

This study answers the call of Lashari et al. (2021) that collecting data from consumer audiences in different countries will help complete the big picture of EV purchasing intention. It also provides clues to help develop potential strategies that can be used to reduce the effects of climate change within the

framework of the 2030 Sustainable Development Goals. Understanding the factors that influence consumers' decisions to purchase EVs can inform strategies to enhance the market potential of sustainable vehicles. In addition to the theoretical and practical contributions, this research also has some limitations. The fact that the sample included only Turkish consumers renders the results less generalizable. The research findings are constrained by the information provided in the survey form. Future research could employ a combination of quantitative/qualitative techniques to gain a more comprehensive understanding of the subject matter. In their compilation study on consumers, Ivanova and Moreira (2023) determined that numerous variables are effective in different cultures. In order to achieve more effective results and interpretations in developing markets, models incorporating additional variables, such as price and trust perception, economic and savings benefits, can be developed.

Compliance with Ethical Standards

Ethical Approval

Ethical approval for this study was received from the Nevşehir Hacı Bektaş Veli University Scientific Research and Publication Ethics Committee (28/02/2024 number: E-95674917- 2024.03.40).

Author Contributions

The author confirms the sole responsibility for the following: study conception and design, data collection, analysis and interpretation of results, and manuscript preparation.

Declaration of Conflicting Interests

The author declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

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