ISTANBUL BILGI UNIVERSITY
INSTITUTE OF SOCIAL SCIENCES
MARKETING COMMUNICATION MASTER'S DEGREE PROGRAM

USAGE INTENTION TOWARDS ELECTRIC VEHICLES IN TURKEY

ESMA MORGÜL
115652022

Assoc. Prof. Dr. Kaan VARNALI

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Usage Intention Towards Electric Vehicles in Turkey

Türkiye'de Elektrikli Araçlara Yönelik Kullanım Niyeti

Esma Morgül
115652022

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PREFACE

As a lover of the nature, the increasing effects of the climate change made me think about my personal targets to protect the environment, recently. Electric vehicles, as a new technology and a good solution for air pollutions, excited me a lot. But the level of the sales in Turkey has disappointed me. Therefore, I wanted to find out the reasons behind this problem to think about the solution. This research has been a perfect experience for the beginning of my academic career. Furthermore, meeting people who really care about environment encouraged me to continue working on sustainability.

I wish to express my sincere gratitude to all who voluntarily participated in this research.

I sincerely thank my supervisor Assoc. Prof. Dr. Kaan Varnalı for his guidance and encouragement in carrying out this thesis. I also wish to thank Assoc. Prof. Dr. Ayşen Akyüz and Assoc. Prof. Dr. Ali Büyükaslan for their support.

To my lovely family and friends, thanks for being so supportive to me during this experience.

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ABBREVIATIONS

ACEA: European Automobile Manufacturers' Association

BEV: Battery Electric Vehicle

BNEF: Bloomberg New Energy Finance

CAT: Consumer Acceptance of Technology

DMA: [Derindere Motorlu Araçlar]

DOI: Diffusion of Innovations

EV: Electric Vehicle

EVSE: Electric Vehicle Supply Equipment

FCEV: Fuel-Cell Electric Vehicle

HEV: Hybrid Electric Vehicle

ICCT: International Council on Clean Transportation

ICV: Internal Combustion Vehicle

IEA: International Energy Agency

NAM: Norm Activation Model

ODD: Automotive Distributers' Association [Otomotiv Distribütörleri Derneği]

PHEV: Plug-in Electric Vehicle

TAM: Technology Acceptance Model

TEHAD: Turkey Electric & Hybrid Vehicles Association [Türkiye Elektrikli ve Hibrit Araçlar Platformu]

TPB: Theory of Planned Behavior

TRA: Theory of Reasoned Action

UNFCC: United Nations Framework Convention on Climate Chance

VBN: Value-Belief Norm

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ABSTRACT

Evidence suggests that transportation is among the most important factors for climate change. Since air pollution that caused by cars is a major environmental problem, researchers have shown an increased interest in electric vehicles, in recent years. However, one of the main obstacles is that sales are not widespread enough yet. This thesis suggest that diffusion of electric vehicles depends on finding the determinants of consumer intention to use. Most previous published studies in Turkey have only focused on technical and economic aspects. Up to now, far too little attention has been paid to consumer behaviors in this regard. The primary aim of this thesis is to investigate the most important predictors of Turkish consumers' usage intention towards electric vehicles. The findings should make an important contribution to marketing and communication strategies. The research data in this thesis is drawn from three main sources: literature review as secondary source, qualitative and quantitative methods as primary sources. First, 10 interviews were organized according to literature findings. Then, from the results of both literature review and the qualitative studies, four hypotheses were developed and tested through a questionnaire with the sample of 355 undergraduate students.

Keywords: *Marketing Communication, Consumer Behavior, Electric Vehicles, Green Marketing, Sustainability*

ÖZET

Ulaştırma sektörünün iklim değişikliği üzerindeki önemli etkileri son yıllarda birçok çalışma ile ortaya konulmuştur. Bu durum tüm dünyada elektrikli araçlarla ilgili akademik çalışmalarda bir artış meydana getirmiştir. Ancak elektrikli araçların satış seviyelerinin düşük olması istenilen düzeyde çevre katkısının önünde bir bariyer olmaktadır. Bu tez -uluslararası birçok yayında önerildiği üzere- elektrikli araçların yaygınlaşmasının tüketicilerin kullanım niyetine etki eden faktörlerin tespit edilmesine bağlı olduğu düşüncesinden yola çıkmaktadır. Türkiye'de bu alanda yapılan araştırmaların birçoğu ekonomik ve teknik detaylara odaklanmıştır. Tüketici davranışları açısından değerlendirme yapan yeterli sayıda araştırma bulunmamaktadır. Bu bağlamda tezin birincil amacı tüketicilerin elektrikli araç kullanım niyetlerine etki eden faktörleri incelemektir. Bulguların sektördeki markaların Türkiye'deki pazarlama ve iletişim stratejilerine katkıda bulunması beklenmektedir. Araştırmada ilk olarak ikincil kaynaklar incelenmiş, buradan elde edilen bilgiler ışığında 10 elektrikli araç kullanıcısı ile derinlemesine mülakatlar gerçekleştirilmiştir. Araştırmanın son aşamasında mülakatların analizinden elde edilen bulgular ve literatürden elde edilen teorik bilgiler ışığında dört adet hipotez oluşturulmuş ve 355 lisans öğrencisine anket uygulanarak test edilmiştir.

Anahtar Kelimeler: *Pazarlama İletişimi, Tüketici Davranışları, Elektrikli Araçlar, Yeşil Pazarlama, Sürdürülebilirlik*

INTRODUCTION

In 19th century, rechargeable batteries were developed and widely used for electric vehicles until gasoline became to dominate the market. However, since air pollution levels have increased, and efficient use of natural sources have become a spreading trend all around the world, sustainable products such as green vehicles have universally taken an imperative place in the market again. 195 countries, including Turkey, agreed on decreasing greenhouse gas emission levels in 2015 United Nations Climate Change Conference. As discussed in the conference, fossil fuel vehicles are one of the top agents of high carbon emissions. Therefore, variety of the participating countries target to eliminate fossil fuel vehicles from traffic by 2030. Although Turkish government made very important efforts such as tax policies, infrastructural strategies, use of electric powered public transportation, some barriers are yet to be overcome for car manufacturers to enter Turkish market with electric vehicle models. Most foreign brands still prefer to offer only hybrid models in Turkey since these models do not require any behavioral change and yet they provide saving on fuel costs. In fact, Turkey's Electric Vehicle Market increased 4.3 times in the first half of 2017 compared to the same period of the previous year and %97 of the sales were hybrid models (Turkey Electric & Hybrid Vehicles Association [TEHAD], 2017).

Considering electric vehicle technology is a new technology, it requires some practice for habit changes, such as charging and understanding the way how battery system works. This unusual technology also brings some doubts related to usage convenience such as driving range, speed limits and maintenance costs. According to Jin and Slowik's (2017) literature review study, consumer awareness is one of the most leading aspects for global adoption of electric vehicles. Seeing that there are not enough electric vehicles in streets of Turkey, it is hard for most of the population to develop healthy attitudes towards this new technology. During the time that electric vehicle technology is still in development stage it is crucial for the automotive brands to break the anxiety of habit changing on consumers' minds with appropriate promotions. Mass media's great impact can help develop environmental norms in society, such as social pressure about climate change; and buying intention can be raised through campaigns. In their research, Moons and De Pelsmacker (2015)

confirmed that mass media have a stronger impact on intention than peers and they also claimed that promotions should be focused on evoking positive emotions for electric cars.

The aim of this thesis is to determine the most important factors influencing consumer usage intention towards electric vehicles in Turkey and to what extend these factors are affecting usage intention. For this purpose, a three-step research has been conducted. First of all, secondary data from the developing literature has been examined. In the light of the findings, one on one interviews have been prepared and applied with 10 participants to find out if there is a significant cultural difference of the earlier adopters in Turkey than other countries. After developing the hypotheses through primary and secondary data results, a quantitative survey has been conducted to 355 undergraduate students to test the model in an adequate sample. Furthermore, a secondary aim is to gather insight from Turkish consumers' intentions associated with electric vehicles. In this regard, findings of the study is examined in the context of marketing and communication strategies at the discussion part.

0.1.Scope and Research Question

Up to now, a number of the early electric vehicle consumer research has focused on intention to adopt electric vehicles (Barbarossa, De Pelsmacker, & Moons, 2017; Noppers, Keizer, Bolderdijk, & Steg, 2014; Schuitema, Anable, Skippon, & Kinnear, 2013), whereas some other studies have attempted to explain intention to use electric vehicles (Moons & De Pelsmacker, 2015; Y. N. Sang & Bekhet, 2015). Since EVs haven't got a large market in Turkey yet, it is not rational to focus on adoption for now. Instead, based on the view that intentions are the immediate determinants of the actual behavior, this study investigates the usage intention towards EVs (Ajzen, 1991; Bamberg, Ajzen, & Schmidt, 2003).

Another important aspect of this research is to provide insight about cultural differentiations. According to a recent cross-cultural study, cultural differences have an essential effect on attitude and intention towards electric vehicles, thus it is necessary to be further explored (Barbarossa, Beckmann, De Pelsmacker, Moons, & Gwozdz, 2015). Therefore, this study is aimed to apply a valid and appropriate model to Turkey. However, a vast majority of charging stations in Turkey is located in

İstanbul (Derindere Motorlu Araçlar [DMA], 2018). Considering most of the battery electric vehicle sales have landed in İstanbul, it is assumed that a sufficient sampling from İstanbul can represent the Turkey's population in the current circumstances.

Normally, it is imperative to separate the type of electric vehicle that focused in the research. Several scholars suggests that consumer behavior towards battery electric vehicles and plug-in electric vehicles are needed further investigating since these kind of EVs are especially required drastic behavioral changes (Li, Long, Chen, & Geng, 2017; Rezvani, Jansson, & Bodin, 2015; Schuitema et al., 2013). Results of the exploratory research of this study also supported that hybrid cars don't differ much from conventional cars from the point of consumers' view, whereas behavior towards battery electric vehicles depends on a more complex decision-making process. However, there are not much of a research in Turkey about consumer behavior towards any kind of alternative fuel vehicles yet. Therefore, after analyzing the pilot questionnaire and exploratory study, it is decided that this thesis' scope shall include all three kinds of electric vehicles.

Taken together, this study is aimed to answer the following research question:

What are the determinants influencing consumer usage intention towards electric vehicles in Turkey?

CHAPTER ONE
LITERATURE REVIEW

1.1.Electric Vehicles (EVs)

1.1.1. Electric Vehicle Types

Electric vehicles not only have environmental benefits as emission levels but also provide better performance, energy efficiency and comfort; yet they can't be the most advantageous options because of charging times and ranges (Gürbüz & Kulaksız, 2016). There are 3 types of this developing technology as follows; Hybrid Electric Vehicles (HEV), Plug-in Hybrid Electric Vehicles (PHEV), Battery Electric Vehicles (BEV) (Schuitema et al., 2013).

Hybrid Electric Vehicles (HEV) use both an internal combustion engine and an electric motor together and provide fuel cost savings (Egbue & Long, 2012). A regenerative break system charges the battery, therefore this type of EVs do not need to be charged from outside (Schuitema et al., 2013). Toyota, the first mass-produced HEV in the market was launched in 1997 (Toyota Motor Corporation, 2008). HEVs become widespread easier than other electric vehicle types since they don't require any habit changes (Rezvani et al., 2015).

Plug-in Hybrid Electric Vehicles (PHEV) have a larger battery than HEVs, and require external charging (Caperello & Kurani, 2012). Battery Electric Vehicles (BEV) don't have an internal combustion engine, only run with an electric motor and must be charged from an electric outlet (Egbue & Long, 2012). Although BEVs make zero emission and are cheaper to run (Egbue & Long, 2012), they bring along some behavioral changes such as charging habits and range anxiety (Rezvani et al., 2015). Much of the current literature on electric vehicle adoption pays particular attention to BEVs because of these behavioral change requirements (Caperello & Kurani, 2012; Graham-Rowe et al., 2012; Rezvani et al., 2015; Schuitema et al., 2013; Skippon & Garwood, 2011).

1.1.2. History of Electric Vehicles

First countries that tried to produce electric vehicles in history are England and France, followed by US (Anderson & Anderson, 2010, p. 22). The first electric vehicle was introduced to market in 1881 by a French electric engineer Gustave Trouvé (Eshani, Gao, Gay, & Emadi, 2005, p. 13). The invention of regenerative break system by M.A. Darracq in 1897 was one of the most significant developments in EV technology (Eshani et al., 2005, p. 13). Public perception about electric vehicles is very good in between the years 1895 to 1905, due to ease of use and comfort of the automobiles (Anderson & Anderson, 2010, p. 22). However, compared costs, performance, and range of the EVs caused gasoline-powered automobiles to dominate the market after 1900's (Eshani et al., 2005, p. 14). Henry Ford understood the consumer needs back in 1900's and used them to promote internal combustion engine. Bad roads were causing important problems for automobiles, so he focused on the purchase costs and easy repair. Interchangeable parts of the vehicle led to a fast production. Accordingly, low costs and visibility of the automobile brought fame to the innovation (Anderson & Anderson, 2010, p. 169).

Transportation sector has a significant influence on greenhouse effect, which is caused by emissions of toxic gases in the atmosphere (Eshani et al., 2005, p. 4). This emissions led to global warming since the beginning of the Industrial Revolution (Dahlstrom, 2011, p. 37). First hybrid motors were developed to assist internal combustion engines in terms of range and performance, however, after World War I, technology of ICE's had reached a point that made hybrids unnecessary (Eshani et al., 2005, p. 16). Research about electric vehicles was conducted in 1960's and 1970's, yet the range and performance still weren't competitive (Eshani et al., 2005, p. 14).

In early 1980's sustainability, which is the last and the most significant development of green marketing, was adopted as a strategic aim by companies and governments around the world and led to a clear technology production (Peattie, 2001). General Motors (GM), aimed to reposition the brand as an innovative company and produced EV-1 after a long-term research and development stage (Rogers, 2003, p. 348-354). Even though GM reached a good success, it was obvious that electric vehicles could not compete with conventional cars because of low range and

performance traits. This resulted in the re-invention and mass production of hybrid cars (Eshani et al., 2005, p. 14). In 1997, Toyota released Prius model as the first commercial hybrid model and applied the strategy to focus on environmental attributes and fuel savings without requiring habit changes. As a result, Toyota reached a real achievement in electric vehicle market (Anderson & Anderson, 2010, p. 166). After General Motor's battery electric vehicle failure, Tesla Motors used lithium-ion batteries to produce an extended-ranged, fast accelerating sports electric vehicle. With a clever marketing strategy, Tesla become a famous electric vehicle brand in the world and this success created a new market of battery electric vehicles (Baer, 2014).

1.1.3. General Evaluation of Electric Vehicles

Based on the assumption that developed countries are mainly responsible for the increase of greenhouse gas emissions since industrial revolution, Kyoto Protocol was adopted internationally on 11 December 1997 to prevent Climate Change. With the protocol, country-based goals were determined thorough some mechanisms that combine encouraging sustainable development, helping other countries to meet emission targets, and stimulating developing countries and private sector to reduce emissions (United Nations Framework Convention on Climate Chance [UNFCC], 1998). In 2015, for an urgent movement to keep global temperature rise well below 2 degrees Celcius above pre-industrial levels, Paris Agreement was adopted by 196 parties. In pursuance of the agreement, countries openly determine, plan and report their contributions to reduce global warming (UNFCC, 2015). To reach the determined goals of Paris Agreement, energy-related greenhouse gas emissions have a crucial impact, and transport sector covers 23% of these emissions (International Energy Agengy [IEA], 2017). Table 1 shows energy-related emission changes between 2016 and 2017 of the most influential regions in addition to global change. Table 2 shows Turkey's energy-related CO_2 emissions from 1990 to 2015.

Table 1: Change in Energy-Related CO2 Emissions by Region, 2017

Country	Change (Percent)
US	-0,5%
European Union	1,5%
China	1,7%
Rest of Developing Asia	3%
Global	1,4%

Source: IEA (International Energy Agency), 2017

Table 2: Energy-Related CO2 Emissions in Turkey (Thousand Tonnes)

	1990	2000	2010	2015
Energy Industries	37,86	78,32	113,63	135,76
Manufacturing Industries and Construction	32,22	53,39	54,21	57,41
Transport	26,25	35,49	44,38	74,26
Other Sectors	29,24	34,16	64,46	62,68

Source: Turkish Statistical Institute [TurkStat], Greenhouse Gas Emissions Statistics, 1990-2015

Within the context of reducing transportation-caused greenhouse gas emissions, Canada, China, Finland, France, India, Japan, Mexico, The Netherlands, Norway, and Sweden agreed on EV30@30 campaign, which sets the goal of 30% sales share for EVs by 2030. To achieve this goal, governments will need to financially support research about consumer behavior, policy efficacy, and technical improvements (Clean Energy Ministerial, 2017). EU's targets for 2030 requires annual 9% CO_2 reduction between 2020 and 2030 (International Council on Clean Transportation [ICCT], 2016). Table 3 represents total battery electric vehicle sales in EU for the years 2016 and 2017.

Table 3: 2016 - 2017 Battery Electric Vehicle Sales in EU

	2016	2017
European Union	63,479	97,571
EU15	62,596	95,206
EFTA	27,517	37,798
EU (New Members)	883	2,365

Source: European Automobile Manufacturers' Association [ACEA], 2018

According to the report of Bloomberg New Energy Finance [BNEF] (2017) 33% of the global cars will be electric vehicles with %60 market share of China, U.S. and Europe by 2040. Table 4 shows Turkey's battery electric vehicle sales since 2011.

Hybrid electric vehicle sales are slightly higher than BEVs in Turkey (Automotive Distributers' Association [ODD], 2017). This low sale levels may be caused by the lack of models in Turkey. Long-range affordable BEVs and newer electrified car segments, which aren't offered in Turkey yet, are the most preferred models in U.S (BNEF, 2017). Furthermore, current EV models in Turkey don't have compatible prices with conventional models, especially when required habit changes are considered. Table 5 represents a comparison between EV models and conventional models of the same brands in terms of purchase price.

Table 4: 2011-2017 Battery Electric Vehicle Sales in Turkey

Year	Sales	Cumulative Sales
2011	0	0
2012	184	184
2013	31	215
2014	47	262
2015	120	382
2016	44	426
2017	76	502

Source: Automotive Distributers' Association [ODD], 2017

Table 5: EV and Conventional Models Price Comparison

Model	2018 Beginning Purchase Price (TL)	Motor Type
BMW i3	257.600	Electric
Renault Zoe (92hp)	130.000	Electric
Toyota CH-R Hybrid	143.550	Hybrid
Toyota Yaris Hybrid	103.750	Hybrid
BMW i8	1.116.500	Hybrid
Hyundai Ioniq Hybrid	159.900	Hybrid
Toyota CH-R	121.350	ICV
Toyota Yaris (1.5)	77.000	ICV
Renault Clio (90hp)	95.850	ICV

Sources: BMW, Hyundai, Renault, Toyota.

Tax reduction policies are one of the most influential solutions that were applied by developed countries. For example, Germany and Austria applies tax reductions and exemptions, whereas France and England EV buyers are granted by bonus incentives (ACEA, 2018b). Similarly, U.S. provides a tax credit between $2,500

to $7,500 per new car until each manufacturer sales 200,000 electric vehicles (U.S. Department of Energy, n.d.). In Turkey, where conventional vehicle private consumption taxes change between 45% and 160% depending on engine size, battery electric vehicle buyers pay these taxes between 3% and 15%, and hybrid electric vehicle buyers pay for EVs to be widely adopted such as, support on RD&D on technologies and EVSE (Electric Vehicle Supply Equipment) developments (IEA, 2017b). Charging infrastructure and especially home charging is another significant problem that needs to be solved in order to reach the expected amount of sales (BNEF, 2017).

Despite the negative outlook that derived from purchase prices, reducing battery costs are painting a promising picture for near future (BNEF, 2017). Shafiei et al. (2012) suggested that the combination of high gasoline prices, lower EV prices, tax reductions and well-structured charging stations can lead EVs to dominate the market in 2030. Automotive industry can also contribute EV diffusion by educating consumers, especially on the benefits rather than environmental aspects, stimulating business partnerships, and trying to differentiate consumer experience by technological features of EVs (Gyimesi & Viswanathan, 2011).

1.1.4. Marketing Strategies for Electric Vehicles

Gasoline consumption that is used in transportation is a primary cause of climate change in terms of air pollution (Dahlstrom, 2011, p. 8). Yet, as a very good solution to this problem, EVs are high involvement products (Garling & Thogersen, 2001) which needs more promotion to compete with conventional cars in terms of market share (Anderson & Anderson, 2010). There are some possible reasons that concern consumers closely about EVs such as high purchase prices, few number of charging stations, safety concern, and habit change requirements caused by range, noise, and maintenance (Ustabaş, 2014). Therefore, some scholars state that marketing strategies for environmentally sustainable innovations such as electric vehicles should target early adopters in the development step of diffusion (Bamberg & Möser, 2007; Barbarossa et al., 2015; Garling & Thogersen, 2001; Lane & Potter, 2007).

Producing and marketing of sustainable products became vital for companies in terms of competitiveness, by the development of "Green Consumer" concept, which assumed that consumer behaviors are affected by consumers' environmental concerns (Peattie, 2001). According to an empirical research, consumers who concern about environment mostly assume that companies are responsible to take precautions about ecological issues (Laroche, Bergeron, & Barbaro-Forleo, 2001). However, a company that replaces all of its products with green products might not be successful, especially in niche sectors such as cars (Jansson, Nordlund, & Westin, 2017). When demand for a green product is low in a market, as in the example of EVs, Dahlstrom (2011) offers "shaded green" marketing strategy that requires to emphasize on other aspects instead of ecological features of the product to differentiate in competition (p. 204). According to Dahlstrom (2011) while forming a value proposition to a green product, it is important to emphasize that benefits exceed the relative price (p. 109). For example, in early 1900's, advertisers focused on the freedom, romance, refinement and fun image of the electric vehicles because they targeted women and physicians as potential customers (Anderson & Anderson, 2010).

According to Rogers (2003), knowledge is the first stage of the decision process. Especially in green products, it is crucial for consumers to be informed about the relation between a green product and its contribution to environment, otherwise it is not likely to adopt even for an environmentalist consumer (Gabler, Butler, & Adams, 2013). Gabler et al. (2013) argues that authenticity of the information is a crucial aspect when advertising for a green product. Sethna and Blythe (2016) suggest that trial of an innovation is really an effective way to form positive perceptions in consumers' minds. Similarly, Skippon and Garwood (2011) argues that, for overcoming the obstacles in consumers perception towards EVs, direct experience is influential. In a study that inspects the possibility of Turkey's electric vehicle adoption, scholars suggest that educational and technical seminars about good features of EVs are a good way to create awareness (Tüccar, Tosun, Özcanlı, & Aydın, 2013).

A recent multi-cultural study found that green self-identity is significantly related to electric car adoption intention (Barbarossa et al., 2017). Other scholars also find that consumers who have green life style are more likely to be the early adopters of electric vehicles (Hidrue, Parsons, Kempton, & Gardner, 2011; White & Sintov,

2017). Lane and Potter (2007) state that targeting early adopters of EVs is a good strategy. However, Jansson et al. (2017) argue that not every segment of consumers care about environment, therefore a careful segmentation study is very important before advertising. Peattie (2001) suggests that considering green products as niche markets that only environmentally concerned consumers purchase, could lead unsustainability of production for companies, therefore, mainstreaming of these products are very important. Therefore, green marketing strategies should cover whole society of target markets, and focus on positive impacts of the product such as total costs instead of the purchase price (Gabler et al., 2013; Peattie, 2001).

There are some imperative factors about electric vehicles that create some concerns in consumer's mind such as purchase price, habit changes related to driving, sufficient number of charging stations, and safety (Ustabaş, 2014). Therefore it is important to identify the concerns of consumers and create a value proposition based on the good features of the electric vehicles (Dahlstrom, 2011, p.109). For determining the influencing factors of EV adoption, a study by Hidrue et al. (2011) found that range anxiety, charging time and purchase price are important factors, yet demographic factors and life style is also effective on electric vehicle adoption. Malhotra (2010) states that when the background causes of behavior are not clear, it is beneficial to combine qualitative and quantitative research for providing valuable insights to marketing strategies (p. 171).

1.2.Theoretical Framework

1.2.1. Pro-environmental Behavior

Pro-environmental behavior represents both individual values and interests, and care for others, such as preventing air pollution for the next generations (Bamberg & Möser, 2007). EVs are broadly viewed as eco-friendly innovations, therefore various scholars assumed EV adoption behavior as a pro-environmental behavior (Axsen, Orlebar, & Skippon, 2013; Rezvani et al., 2015; White & Sintov, 2017). Most of the studies in green marketing that use TPB model, prefer to develop and use an extended version which includes environmental factors (Moons & De Pelsmacker, 2015; Paul, Modi, & Patel, 2016; Wang, Fan, Zhao, Yang, & Fu, 2016). The accuracy

of these extended TPB models are generally high (Moons & de Pelsmacker, 2012; Paul et al., 2016; Wang et al., 2016). However, one major drawback of this approach is that there is a gap between environmental concerns and pro-environmental behavior which can be explained by other casual factors (Stern, 2000). This view is supported by Bamberg and Möser (2007), who write that cultural differences may have an imperative role on environmental motives. Similarly, in their psychological perspective study, Tam and Chan (2017) demonstrate that cross-cultural differences have an important effect on pro-environmental behavior. Another problem with this approach is that the type of the targeted behavior is influential, thus pro-environmental behavior towards different products should be investigated separately (Bamberg & Möser, 2007; Stern, 2000). In a study conducted by De Groot and Steg (2007), it was shown that environmental concerns' effects differ between particular behaviors. It is necessary to examine the base of pro-environmental behavior towards car use regarding the separation of egoistic, altruistic, and biospheric reasons of environmental concern (de Groot & Steg, 2007).

Deloitte (2014a), in their automotive consumer study conducted in Turkey, reported that environmental concerns are of the less determining factors of car buying decision for all generations. Pilot interviews in this study also supported that the majority of public's buying decision does not depend primarily on environmental concerns. Despite these negative aspects, some scholars included personal norms in relation with pro-environmental behavior to TPB model (Bamberg & Möser, 2007; Wang et al., 2016). Similarly, Ajzen (1991) tested personal norm in TPB model and found that explained variance had increased significantly. Considering all of this evidence, it seems that even though prediction of pro-environmental behavior needs a deeper understanding, it is beneficial to involve environmental aspects in TPB model when investigating a green product, for instance, EVs (Ajzen, 1991; Bamberg & Möser, 2007).

1.2.2. Prediction of Usage Intention

It is a common view that intention is an effective predictor of behavior (Ajzen, 1991; Rezvani et al., 2015; Schuitema et al., 2013). Ajzen (1991) argues that,

intentions are strong influencers of the actual performance because they indicate a strong motivation and willing. Davis (1989) has shown that behaviors through new technologies can be predicted by intentions with an appropriate measurement. Since EV is a new technology that hasn't reached the high level of sales yet, it is not practical to measure behavior itself (Schuitema et al., 2013). Therefore, the research about electric vehicle technology has tended to focus on intention as the dependent variable rather than behavior (Carley, Krause, Lane, & Graham, 2013; Moons & De Pelsmacker, 2015; Schuitema et al., 2013). Usage intention towards EVs is influenced by both external factors such as policy, technology, society, and internal factors such as personality, environment and income (Rezvani et al., 2015). Different theories have been used in the literature regarding consumer intention towards electric vehicle (Adnan, Nordin, Rahman, Vasant, & Noor, 2017; Jin & Slowik, 2017; Li et al., 2017; Liao, Molin, & van Wee, 2017; Rezvani et al., 2015). In their review of electric vehicle adoptions, Rezvani et al. (2015) point out that consumer intention towards electric vehicles should be investigated by both internal and external factors such as technology, policy, personality and social impacts. Another systematic review by Adnan et al. (2017) identify the main factors affecting adoption, and theories that have been used for investigating these factors, as five categories as follows (Adnan et al., 2017):

- Theory of planned behavior and rational choice theory,
- Normative theories and environmental attitude,
- Lifestyle, self-identity and symbol,
- Diffusion of innovations and consumer innovativeness,
- Emotion and consumer.

Rational choice theory and theory of planned behavior, claiming that consumer behaviors are based on utility maximization, are of the most commonly used theories in EV literature (Rezvani et al., 2015). These research assumes consumer EV adoptions are rationally affected by different aspects such as technical attributes, costs, policies and environmental concerns (Rezvani et al., 2015). Diffusion of innovations framework introduced by Rogers (2003), has been widely used in EV literature as a result of consideration of EVs as eco-friendly innovations (Li et al., 2017; Moons & De Pelsmacker, 2015; Peters & Dütschke, 2014; Rezvani et al., 2015; Y. N. Sang &

Bekhet, 2015). In the concept of diffusion of innovations, Rogers (2003) identifies five perceived attributes of innovations as: relative advantage, compatibility, complexity, trialability, and observability. To identify the early adopters of electric vehicles, Peters and Dütschke (2014) applied a diffusion of innovations model that includes social norms, beside the five attributes of innovations. Peters & Dütschke (2014) also compare other models regarding acceptance of new technologies such as technology acceptance model (TAM) in their study. One criticism of most literature on such theories is that they don't take account of emotions, motives of car driving, or personal values (Moons & De Pelsmacker, 2015; Rezvani et al., 2015; Schuitema et al., 2013). Despite the fact that theory of planned behavior includes some psychological factors, normative theories such as value-belief norm theory, lifestyle practices theory, and costly signaling theory provide a broader aspect about personal values, therefore it has been used for investigating pro-environmental behavior towards EVs (Noppers et al., 2014; Schuitema et al., 2013; Skippon & Garwood, 2011).

Table 6 shows commonly used models in BEV studies. BEVs are among the most eco-friendly option compared to other EVs because of a higher battery capacity and mainly charging with plug-in charger (Li et al., 2017). Schuitema et al. (2013) argues that unlike other alternative fuel vehicles, behavioral changes are necessary for using battery electric vehicles, therefore behavior towards BEVs is required to be deeper examined. Hence, table bellow only includes BEV adoption studies which were held on different countries in recent years and focused on the theories that have been mainly used by these studies. Even though this study was not focused only on BEVs, compared awareness level of any kind of EVs in Turkey is supposed to show similarity to BEV awareness in other countries. Taken together, these studies support the notion that theory of planned behavior is an appropriate method for determining the factors affecting usage intention towards electric vehicles.

Table 6: BEV Studies

Authors (Year)	Country	Sample	Method	Theory	*Factors*
Lai, Liu, Sun, Zhang, & Xu (2015)	China	308	Survey	Rational Choice Theory	*Environmental Concern, Environmental Policy, Economic Benefit, Perception of EVs*
Sang & Bekhet (2015)	Malaysia	751	Survey	Theory of Planned Behavior	*Social Influence, Financial Benefits, Performance Attributes, Environmental Concern. Government Intervention. Infrastructure*
Noppers, Keizer, Bolderdijk, & Steg (2014)	Netherlands	109	Survey	Costly Signaling Theory	*Instrumental, Symbolic, Environmental*
Peters & Dütschke (2014)	Germany	969	Online Survey	Diffusion of Innovations	*Relative advantages, Compatibility, Ease of Use, Trialability, Observability. Social Norm*
Carley, Krause, Lane, & Graham (2013)	USA	2302	Online Survey	Rational Choice Theory	*Charging Time, Range, Purchase Cost, Advantages and Disadvantages, Awareness and Visibility, Environmental Views, Vehicle attributes of interest*
Egbue & Long (2012)	USA	481	Online Survey	Theory of Planned Behavior	*Demographics, Safety, Range, Reliability, Infrastructure, Environmental Awareness. Experience. Interest*
Moons & de Pelsmacker (2012)	Belgium	1202	Survey	Theory of Planned Behavior	*Attitudes, Emotions, Subjective norms, Perceived behavioral control*
Hidrue, Parsons, Kempton, & Gardner (2011)	US	3029	Survey	Rational Choice Theory	*Demographics, Driving Range, Purchase Cost, Fuel Cost, Charging Time, Environmental Concerns*
Lieven, Mühlmeier, Henkel, & Waller (2011)	Germany	1152	Online Survey	Rational Choice Theory	*Price, Range, Performance, Environment, Durability, Convenience*
Zhang et al. (2011)	China	299	Survey	Rational Choice Theory	*Awareness, Knowledge, Performance, Government Policy, Environmental Requirement, Opinion of Peers, Purchase Price, Fuel Price, Tax Reduction, Fuel Availability, Maintenance Cost, Vehicle Safety, Demographics*

1.2.3. Factors Influencing Electric Vehicle Usage Intention

1.2.3.1. Instrumental Factors

Consumers' lack of knowledge of this new technology reveals a number of challenges in the adoption process (Consumer Federation of America, 2015). Carley et al. (2013) states that even though fuel saving is one of the main advantages of EVs, consumers are unaware of this potential. An early study in the US reveals the misconceptions of consumer perception and concerns about how to charge an electric vehicle, working principles of vehicle and battery, and fuel saving issues (Caperello & Kurani, 2012). In fact, as Caperello and Kurani (2012) stated, consumers' worst concern is to run out of charge while driving on the road.

The range of electric vehicles and the frequency of charging stations are of great importance to consumers (Hidrue et al., 2011; Skippon & Garwood, 2011). Since this is an unknown technology, behavioral changes such as charging, performance of the vehicle, service and maintenance costs, and range anxiety cause some doubts on consumers' mind (Rezvani et al., 2015). For instance, Carley et al. (2013) found that costs, range limitations, and charging time of plug-in electric vehicles are in significant negative relationship with intent to purchase. By contrast, Moons and De Pelsmacker (2015) revealed that these instrumental constraints are not relevant to usage intention, but they also argue that this results may be caused by the lack of information. A broader perspective has been adopted by Noppers et al. (2014) who argue that, when investigated with an indirect method, instrumental attributes are not significant predictors of adoption towards sustainable innovations.

Even though prediction power of instrumental factors are still uncertain, purchase prices are one of the important factors according to majority of EV research (Hidrue et al., 2011; Kim, Rasouli, & Timmermans, 2014; Krause, Lane, Carley, & Graham, 2016; Tanaka, Ida, Murakami, & Friedman, 2014). In Turkey, Deloitte's (2014) consumer research has revealed that all generations prefer to switch electric vehicles in 5 years, but the most important factor for that is the cost. Similarly in a comprehensive study, Hidrue et al. (2011) revealed that in US, consumers are effected by purchase costs and fuel savings more than environmental concerns. Concerning this

is a developing technology, batteries and other new materials cause purchase costs to be more expensive than conventional models (Eshani, Gao, Gay, & Emadi, 2005, p. 308). Yet several studies argue that government incentives have provided an effective solution to lower the prices and increase sales (Krause et al., 2016; Tanaka et al., 2014; Zhang et al., 2011). In fact, in a comprehensive study investigating the effects of government incentives towards HEV adoption, Gallagher and Muehlegger (2011) found that state tax incentives have a positive significant effect on adoption.

1.2.3.2. Environmental Factors

Since the most important attribute and the reason of production of electric vehicles is reducing carbon emissions, most of the EV consumer studies are focused on ecological factors (Axsen et al., 2013; Gallagher & Muehlegger, 2011; White & Sintov, 2017). Several studies reveal that the consumers who express themselves as environmentalists tend to adopt EVs easier than other groups (Kim et al., 2014; Skippon & Garwood, 2011; Ziegler, 2012). White & Sintov (2017) discuss that consumers perceptions of EVs as a symbol of environmentalist self-identity effects their intention to adopt. Some other scholars also shown that people who have green self-identity tend to adopt EVs earlier than other groups (Carley et al., 2013; Noppers et al., 2014; Schuitema et al., 2013). Furthermore, Carley et al. (2013) state that environmental attitudes are positively related to interest in PHEVs. Similarly, a qualitative study by Jansson, Nordlund, and Westin (2017) revealed that personal norms regarding environmental concerns have a significant effect on electric vehicle adoption. In Turkey, especially generation Y cares about environmentalism in transportation and willing to pay much for an alternative fuel vehicle more than a conventional car (Deloitte, 2014a). Erdem, Şentürk, and Şimşek (2010) state that environmentalism positively affects purchase intention for hybrid electric vehicles in Turkey.

1.2.3.3. Social and Symbolic Factors

Besides their functional attributes, automobiles have symbolic meanings for their owners such as power and statute (Steg, 2005). An early research in electric

vehicle adoption has shown that drivers were influenced by the reactions from others related to the vehicle's appearance or performance (Graham-Rowe et al., 2012). Lane and Potter (2007) support the idea that cars are status symbols, in fact, they state that drivers want to take attention with their eco-friendly vehicles. Similarly, Axsen et al. (2013) argue that EVs are seen as symbols of intelligence, responsibility, and environmentalism.

Several scholars found that green self-identity is related with consumer intentions towards the adoption of EVs (Barbarossa et al., 2017; Carley et al., 2013; Noppers et al., 2014). Barbarossa et al. (2017) further examined that open-to-change consumers are like to express their green self-identities by showing off their eco-friendly products. Beside green self-identity, innovativeness also affects adoption (White & Sintov, 2017). In fact, Skippon & Garwood (2011) found that people refer themselves as innovative and environmentalist tend to be the early adopters of EVs. Concerning other motivations towards car use (Steg, 2005), Schuitema et al., (2013) revealed that symbolic and hedonic factors have an effect on electric vehicles adoption. On the other hand, a study conducted in Turkey by Uzel (2015) found that hedonic motives of drivers negatively affects electric vehicle purchase. However, Uzel (2015) states that these results are related to lack of knowledge about electric vehicle technology.

Based on the thought that EVs are observable products (Jansson et al., 2017), Axsen, Orlebar, and Skippon (2013) revealed that social interactions have an important effect on consumers adoption to electric vehicles. They demonstrated that social influence can be used for changing perceptions especially about environmental effects of electric vehicles (Axsen et al., 2013). A broader perspective was presented by Moons and De Pelsmacker (2015) who found that peers do not have a strong influence on consumer attitudes and they explain this result with lack of vehicles on the streets in early stage of this new technology. Media's influence, on the other hand, has a strong influence on emotions towards electric vehicles according to the same study (Moons & De Pelsmacker, 2015). Other studies support that media as a promotion tool can be effective for raising consumer awareness (Jin & Slowik, 2017). Jansson et al. (2017) states that, opinion leaders such as celebrities may have an influential effect on consumer attitudes for the diffusion of environmental technologies.

CHAPTER TWO
RESEARCH

2.1 Exploratory Study

Despite the fact that quantitative methods strengthen the generalizability of a research, they are not as good as qualitative methods when researcher needs a more comprehensive and a deeper insight, especially when the research subject involves a small population or, there is a lack of research done in the field (Creswell, 2015, p. 5). Furthermore, some of the hidden motives, values, and emotional drives can be investigated well trough exploratory qualitative research (Malhotra, 2010, p. 172). Since most of the electric vehicle studies that were published in Turkey don't present a consumer behavioral aspect, this study needed an exploratory research to test if there are any cultural differences from international literature before conducting a general quantitative study grounded on international literature. Hence, it was aimed in this exploratory research to find the fundamental themes related to electric vehicle usage intention in Turkey and compare those themes with the most common findings in international electric vehicles consumer behavior literature. A second aim is to define the scope and hypotheses for the following quantitative study.

2.1.1. Sampling

The participants were selected on the basis of experience of driving electric vehicle. Convenience and snowball sampling methods were used together because of limited number of EV drivers in Turkey (Rog & Bickman, 2009). Participant 1 was known as an expert in electric vehicles by several authorities, therefore, was contacted primarily. For participants 3, 5, 6, and 7, snowball sampling method was used. Other five participants were reached from a closed Facebook group named '*Türkiye Tesla Model 3 Sahipleri*' [Turkey Tesla Model 3 Owners], which members have strong interest in electric vehicles ("Turkey Tesla Model 3 Owners," n.d.). Participants 5, 6, and 7 experienced electric vehicles only once for a test drive for at least 10 minutes. Participants 1 and 8 test drive most of the electric vehicles which they can reach by means of their special interest. Participants 2, 4, and 9 prefer to rent electric vehicles,

occasionally. Participants 3 and 4 own a hybrid electric vehicle, whereas participant 10 own a battery electric vehicle. Demographics of participants are as on Table 7.

Table 7: Demographics of the Sample

No.	**Age**	**Gender**	**Marital Status**	**Education**	**Number of Household's Car**	**EV Experience**
1	43	Male	Single	Bachelor's Degree	0	Test Drive
2	55	Male	Married	Master's Degree	2	Test Drive
3	51	Female	Married	Bachelor's Degree	2	Owns a HEV (Toyota CHR)
4	51	Male	Married	PhD Degree	1	Owns a HEV (Toyota CHR) and often uses BEVs for rental
5	34	Male	Married	Bachelor's Degree	1	Test Drive
6	31	Male	Married	Bachelor's Degree	0	Test Drive
7	34	Male	Married	Bachelor's Degree	0	Test Drive
8	35	Male	Single	Master's Degree	1	Test Drive
9	30	Male	Single	Bachelor's Degree	1	Test Drive and often uses BEVs for rental
10	47	Male	Married	Bachelor's Degree	3	Owns a BEV (BMW i3)

2.1.2. Method

Semi-structured interviews were conducted with ten participants between November 2017 and January 2018. Nine of the interviews were directed face-to-face, whereas one participant contacted by e-mail. All interviews were conducted in Turkish, as all participants' native language is Turkish. Purpose of the research was clearly explained to all participants before the interviews. Furthermore, they were all informed that dialogues were going to be recorded and be used for only academic purpose. Interviews took place in participants' work offices or, in a quiet café,

according to their preferences. Questions were based on the literature and research question.

Themes as follows were involved to interviews; general knowledge and attitude about electric vehicles, driving experience, source of information, general advantages and disadvantages of electric vehicles, government policy, intention to buy and suggest to others. For understanding knowledge and attitude of the participant, in the first part of the interviews, they were asked about their general opinions related to electric vehicle technology. After listening their opinions, they were asked what they think about electric vehicles' future in Turkey and guided to discuss what shall be done for diffusion of electric vehicles in Turkey.

For the second part of interviews, participants were encouraged to talk about their driving experience. Some of the questions in that part were aimed to understand symbolic meaning of driving such as, "What did you feel when you drive an EV?", "Imagine that you see an electric vehicle driver on the road in Turkey, what would you think about him/her?", and "Have you got any reaction from other people while you use an electric vehicle, or when you talk about using an electric vehicle?". Technical preferences as charging habits were also asked in that part. For the participants who own an electric vehicle, direct questions about charging habits were asked. For the participants who don't own an electric vehicle, on the other hand, hypothetical answers were requested as if they have an electric vehicle. Furthermore, they were asked to explain their general expressions about driving an electric vehicle and make comparison with conventional cars.

In the follow-up phase of the study, source of information was determined with a direct question; "Where did you first hear about electric vehicles?". According to participant's reaction, he or she was asked whether that information source was good enough or, was there a difference between the first experience and the given information. Afterwards, participants were encouraged to discuss general advantages and disadvantages of EVs.

For determining the effect of policy factor, general opinions about Turkish government policies related to EVs were asked. Since a domestic car project was popular during those days, further questions about domestic car policy were included

in the interview such as, "Have you heard about the domestic car project, and do you think it should be an electric car?".

For the last part of the interview, intention to buy and factors which affect buying decision were directly asked. Furthermore, participants were asked if they would suggest electric vehicles to other people and on which factors these suggestions would depend. Finally, demographic information was requested.

2.1.3. Thematic Analysis

All dialogues were recorded on smartphone trough Awesome Voice Recorder application during interviews. The recorded data transcribed, word by word, using F5 Transcription program. For primary coding and assigning themes, an online qualitative analysis application Saturate App was used.

This study was not aimed to explore a new insight or factor but only to eliminate cultural differences. Therefore, a theoretical thematic analysis was applied, which most of the codes were generated from existing theories in the literature (Braun & Clarke, 2006). Four main themes were developed after all of the codes were clustered (Table 8). Sample quotes from interviews were written for each theme in the following section.

Table 8: Main Themes and Codes

Themes	Codes	Freq.	Themes	Codes	Freq.
Instrumental	Gear System	18	Social & Symbolic	To be Noticed by Others	20
	Regenerative Break	9		Innovativeness	16
	Automation Systems	9		Environmental Image	23
	Battery	6		Hedonic	18
	Range	21		Freedom	6
	Noise	23		Prestige/Status Symbol	11
	Safety	9	Policy & Marketing	Government Cars	4
	Purchase Costs	16		Public Transportation	5
	Maintenance	19		Battery Production	3
	Fuel Costs/Save	26		Energy Production	4
	Driving Comfort	8		Energy Independency	9
	Performance	17		Tax Policies	8
	Design	15		City Car	4
	Accelerating	16		Lack of Knowledge	3
	Ease of Use	9		Lack of Models	4
	Income	12		Qualified Personnel	2
	Charging Time	10		Internet as an Information Source	11
	Infrastructure	16	Environmental	Future's Technology	6
	Charging Station Frequency	20		Source of Energy	5
	Speed Limits	1		Environmental Attributes of EVs	25

2.1.3.1. Instrumental Factors

2.1.3.1.1. Technical Features

As can be seen in sample quotes related to technical features, most of the drivers who experienced an EV were impressed by the differentiations of this new technology, such as regenerative break and ease of car use caused mostly by not having any complex gear system. This also leads fast accelerating which is an attraction especially for the people who love driving car for fun.

- "It feels like a golf cart or a bumper car. You step on gas pedal and it goes… That's all. There is no gear shifting… It's automatic… You step on gas pedal and it goes… It accelerates as you step." (9)

- "One of the most wonderful details is regenerative breaking… The energy obtained is used again for driving (Isn't that great?). The conversion efficiency rate is about %60." (4)
- "(The most important advantage) for me is accelerating. Absolutely, accelerating. That kind of accelerating is not possible with a normal internal combustion engine, especially when considering same price levels… And it's enjoyable. Very enjoyable." (8)

Another important aspect of this technological innovation is the noise for most of the participants. While some people likes the silence for driving comfort, some of them think this can be dangerous in some situations. Participant 8, on the other hand, reveals a different thought that the noise is very important for some drivers.

- "It can be understood (that it is an EV) from the outside, especially because of its noise. For example, at parking areas… Or when driving through streets in dark evenings… Silence (of the car) cause other car drivers attention…" (1)
- "But there is a disadvantage of silence of the car; you can't be noticed in traffic… You have to keep honking the horn." (6)
- "Thinking that one of the most pleasant things for an automobile driver is motor noise, at first, electric vehicles seemed like they weren't suitable for petrol-heads. But I think there are some brands that disprove this idea, such as Japanese Nio." (8)

2.1.3.1.2. Battery, Range, Charging

Range anxiety is a big problem for most of the participants. However, most of them think positive about this since they perceive EVs as city cars. Especially the participants who experienced an EV for long time in big cities claim that there isn't any difficulty in Istanbul to charge an EV. But even these participants think that EVs are not suitable enough for long distances in Turkey.

- "Range is one of the biggest problems… One other (problem) is charging time… It takes too long to charge… When you compare this to a normal car, it can be fully filled at three minutes and you can drive for 800km." (5)

- "I go for chatting with my friend and take a coffee for half an hour while the car gets charged." (10)
- "In a village road, do you prefer to be stuck on the road with a diesel or an electric vehicle? When asked a question like this, everyone says diesel or gasoline but it's the opposite. Because you can't find a gas station on the village road, but you can find a plug." (1)
- "I had to change my vehicle. I was using a gasoline-powered vehicle. I didn't want to buy a gasoline-powered vehicle when I was changing my vehicle. Therefore, I looked for alternatives. I saw that electric vehicles aren't diffused enough in Turkey yet, and there are not enough charging stations and I thought this can cause problems in long distances, so I passed to a hybrid vehicle." (3)

Another difficulty for charging is about urbanization. Participant 9, who has a lot experience with EVs in both Turkey and Europe, states that having charging facilitates in or around the house is crucial. Correspondingly, most of the other participants affirms that they would prefer to charge their EV at home.

- "…. For instance, we don't have houses like the ones in America. In England, in America, everyone has detached houses. In here, if you buy an electric vehicle you'll have to have a power plug outside (the apartment) … For 1000 TL… You will put an electricity meter there… You will get permission from power administration… Or you'll hang down a cable from your window which is funny." (9)

Some participants have concerns about battery technology. For example, participant 6 thinks short battery life is an extra cost.

- "You need to change the battery… Every two… Five years… It depends on the money you spend. You can buy a good quality battery, but its efficiency gets worse." (6)

2.1.3.1.3. Costs

Cost factors were often discussed during interviews. Most of the participants find purchase costs high compared to conventional models. However, some participants who claim prices are high for a medium income family, still think this prices for a high technology are reasonable. Furthermore, most of the participants

argue that low maintenance costs, fuel savings, and tax incentives make high purchase price more acceptable.

- "It is high… For example, Toyota… The same car is more expensive when it's an electric car… I haven't investigated much but I know it's more expensive than the fossil fuel-powered car." (7)
- "(For Renault Twizy) even those are expensive in Turkey. You see those for a normal car price in electric (vehicles)… You say "Oh, this is a toy, I'll buy a normal car… I'll buy a Peugeot 206… It's okay, it can go everywhere." … It's difficult for electric vehicles in Turkey." (9)
- "… Further than this, you buy an electric car and you just use it. There is no supplementary motor vehicle tax for now. It is a thing that I really want… I would buy a BMW i3 if I had enough money, I wouldn't think of any other cars." (8)
- "I think this car is free. Ok, it is expensive… But, when you watch the production process… It is free… I mean, they provide a really high technology that is unique. Ok, it may be expensive in the first purchase but there is no usage cost. There is no cost, no maintenance of the car… It saves money while it saves the environment." (10)
- "I drive a hybrid Toyota C-HR right now and I am very pleased. I always go to same gas station. Even the gas station personnel had noticed. "We can't see you anymore since you changed to hybrid car. You used to buy gasoline at least once in a week and now we can only see you once in a month." (he/she) said." (3)

2.1.3.2. Policy and Marketing

2.1.3.2.1. Policy

Government policy is another common topic of the interviews. Participants have conflicting ideas about sufficiency of incentives. Most of them find these incentives very low compared to other countries, whereas some of them argue that tax incentives are enough. Most of the participants argue that diffusion of EVs are very crucial to avoid foreign dependency. But there are some concerns about source of

electric energy that would be domestically produced. There are also some ideas that government should take the first step about charging station infrastructures.

- "There is a loop in here. Drivers ask where to charge, charger companies say, "There is no electric vehicle in the market yet, so who can we sell?". This should be balanced by government… By setting charging stations… First of all, it may be obtained by conversion of public vehicles…" (5)
- "…About foreign source dependency… As I know we buy petrol from other countries… Dependency to foreign countries would be decreased because we can produce our own electricity, we have our hydroelectric power stations, thermal power stations, so we can produce our (electricity) sources now… When the energy source will be electricity, dependency will possibly decrease." (7)
- "For now, there aren't any motor vehicle taxes taken from electric vehicles, but there are special consumption taxes and VAT depending on kw level. In many countries in the world, on the other hand, there is no tax for electric vehicles. There should be no tax in our country too for promoting electric vehicles." (4)

2.1.3.2.2. Marketing

Beside government incentives, most of the participants think automobile brands should take responsibility to create awareness in the society with good communication strategies. General opinion of all the participants is that Turkish consumers don't care much about environment, and the most important think is the money they would spend and the social image they would gain.

- "I think automobile producers think wrong… Green… Ecologic… Turkey doesn't listen that kind of things. There are few things that works in Turkey: first; forget gasoline, forget filling up the tank, second thing to say is prestige." (2)
- "Companies can use celebrities for their campaigns. For example, Toyota doesn't have an advertisement for this issue, they may produce more advertisement to help create awareness. Because cars are status symbols, actually. As we all know, target consumers of brands are obvious. Target consumers that hybrid or electric vehicles appeal are younger people, people that are more concerned about environment, and people who really want to do something about this issue. Why

wouldn't they choose hybrid or electric vehicles when they are choosing a vehicle? They should be encouraged more. Not just with taxes but also with perception management." (3)

- "…For example, marketing companies can emphasize on unnecessity of maintenance and performance and they can create awareness. It would be reasonable and advantageous for themselves." (8)

2.1.3.3. Environmental Concerns

To the contrary of the opinion that Turkish consumers don't care about environment, when asked directly to the owners about the emotional aspects of driving an EV, it's stated that environmental concerns are commonly associated with EVs.

- "The person who drives an electric vehicle would have known the problems of the world, concerns about sustainability, and wants to be a leader about this issue." (3)
- "When I drive an electric vehicle, I feel so happy because I don't harm the environment." (4)

Most of the drivers that only had a trial experience, on the other hand, state that the most important advantage of electric vehicles is fuel savings rather than the environmental benefits. Yet, they are also aware of the environmental changes that EVs provide. They think that the typical driver of an EV in Turkey, for the current conditions, is a rich and environmentalist individual.

2.1.3.4. Social and Symbolic Factors

When asked about social interactions that EV drivers encountered, both good and bad reactions were mentioned. Most of the participants think that awareness towards EVs hasn't raised yet, in Turkey. They also think, because cars are usually seen as status or prestige symbols, EVs should look better in the matter of design. Some participants that define themselves as car enthusiasts, state that they love the technological futures of EVs such as automation systems and fast accelerating. But, they also claim that they would prefer more prestigious or sportive models.

- "Reactions are different in Europe than in Turkey… It is different and odd and funny… Awareness is well settled in Europe. In Turkey, on the other hand, not even with electric vehicles but with the hybrid car that I drive now, I get some ridiculous and mocking comments… They ask that why I bought it and where will I charge it, and they say that I've made a mistake and this automobile will not work. We should work about this issue in Turkey." (4)
- "Unfortunately, I think cars are still status symbols in my society. And when it's a status symbol, for example, my neighbor finds strange that I drive a hybrid and prefers to drive a range rover jeep that uses incredible amount of gasoline… Not as a bad thing but he/she asks to me "Why did you buy a car like this?". When I explain to him/her, then he/she understands but still don't see Toyota C-HR as a status symbol." (3)
- "It is awesome to me as a person who works in technology. I mean this is what a man wants most… It has technology… I mean it is like you drive a four-wheel iPad." (2)
- "I also have an opinion that I would like it if my daily automobile was an electric vehicle but, on the weekends, especially for a person who thinks like me, a car with internal combustion engine wouldn't be so bad." (8)

2.1.4. Results

The first important conclusion from the interviews is that most of the interviewees tend to describe themselves as innovative or technology enthusiastic people. Some of the participants directly indicate the importance of their general interest of innovations had influenced them to search about electric vehicles, whereas some of them implicated with anecdotes from their lives that they closely follow new technologies. Hence, these findings can be interpreted as the early adopters of EVs are mostly innovative people (Rogers, 2003).

Instrumental attributes such as range, costs, and infrastructure are the most frequently mentioned aspects throughout the interviews. These findings are congruent with the relevant literature (Rezvani et al., 2015). Especially high purchase costs of electric vehicles are the most common answers to the questions "What would affect

your intention to buy or suggest an electric vehicle?" and "What are the most important disadvantages of electric vehicles?".

Half of the participants concluded that government cars and public transportation vehicles should be transformed to electric vehicles to create awareness and visibility. Corporate cars are also discussed by some of the participants, as it would be very beneficial in terms of costs to companies to use electric vehicles. A similar argument has been made by Garling and Thogersen (2001) who claim that public sector purchase policies and cars that would be used by green companies can be an effective solution to enhance the market and lower the prices when mainstreaming EVs.

Although EVs are mostly positioned as green products, relation between perception of EVs and environmental concern doesn't always seem like the most important aspect, as Rezvani et al. (2015) discussed in their research agenda. Some of the participants tend to confuse with autonomous cars to electric cars because of the perception that Tesla created, and when asked about electric vehicles' general advantages, these participants mostly discussed the advantages of autonomous technology. For example, participant number 2 directly stated that he would prefer to hear technological features about the car that he would buy instead of ecological traits when speaking with a salesperson. This separation of technologists and environmentalists should be considered when developing the targeting strategies because the main reason to adoption intention might differ among these consumer categories (Axsen et al., 2013). Nevertheless, Jansson et al. (2017) disagree with this separation and argue that the potential early adopters can be caring about both technology and environment.

As can be understood from most of the participants' views, cars are mostly seen as status symbols. Since the time that first gasoline engines became popular and electric vehicles gradually vanquished, consumers characterized automobiles as status of power that is mostly associated with masculinity (Anderson & Anderson, 2010, p. 170). Electric vehicles in the current market are mostly seen as city cars which provide fuel savings and driving comfort related to low noise by most of the participants. Even though they are aware of the ecological importance of the car, most of the interviewees imply that they care about the bad comments they heard from other people, especially

about the appearance of the car. When talking about designs of the electric vehicles, most of the participants state that they think EVs shouldn't look so futuristic. For an extreme example, participant 9 referred BMW i3 as "Frankenstein". Instead, they imply that they would prefer a conventional look that provides sophisticated technology as Tesla provides.

Taken together, exploratory study results show that even though there are some details that culturally differentiate from the previous studies, it can be inferred that, at many points, it is reasonable to use verified models from the past literature for a representative sample in Turkey.

2.2. Quantitative Research

In their literature review study Rezvani et al. (2015) concluded that the studies which sample the direct experienced participants, who can also be seen as the early adopters, are not representative to the majority. Hence, a more comprehensive and generalizable sample should be further examined before discussing effective mainstreaming strategies. Therefore, a quantitative research model and hypotheses were developed depending on both qualitative research results and the literature findings.

2.2.1. Conceptual Framework and Hypotheses

2.2.1.1. Theory of Planned Behavior (TPB)

Theory of planned behavior (TPB), which is an extension of Theory of Reasoned Action (TRA) assumes that intentions are derived by attitudes, social norms, and perceived behavioral controls (Ajzen, 1991). TPB has been widely used by travel choice research and other pro-environmental behavior studies (Bamberg & Möser, 2007; Bamberg & Schmidt, 2003; de Groot & Steg, 2007; Park & Ha, 2014). All in all, TPB tries to explain that behavioral intentions are formed by attitudes that derived from salient beliefs, subjective norms developed by normative beliefs, and perceived behavioral control that was received from control beliefs (Y. Sang & Bekhet, 2015). Both TPB and TRA are focused on psychological and sociological behaviors and try

to explain contextual decision-making such as buying behavior towards green products (Paul et al., 2016). The most conspicuous distinction between TRA and TPB is the aspect of perceived behavioral control which indicates non-volitional factors (Ajzen, 1991; Paul et al., 2016). Ling, D'Alessandro, and Winzar (2015) state that even though attitudes are good predictors of behavior, models that take into consideration of other external factors provide a more accurate estimation (p. 430). TPB model takes into account the factor of perceived behavioral control formed by past experiences, and expectations to detect consumer's perception against usefulness or easiness of a product (Sethna & Blythe, 2016, p. 315). Even though applied TPB is a good method for predicting travel behaviors, it is necessary to separately examine different target behaviors and different demographic groups trough a large amount of research (de Groot & Steg, 2007).

2.2.1.1.1. Attitudes

Attitude, that refer to individual's evaluation of the behavior's positive and negative aspects toward a particular thing (Ling et al., 2015, p. 398), is an accurate predictor of behavior according to Theory of Planned Behavior (Ajzen, 1991). In Theory of Reasoned Action (TRA) model, attitude is derived from beliefs, that indicate personal opinions about the results of the intended behavior (Davis, 1989). Ling et al. (2015), argue that attitude is a kind of belief that shows verbal or non-verbal evaluation of how good or bad a thing is (p. 399). In the same vein, Sethna & Blythe (2016), in their book Consumer Behavior note that attitude forms as a consequence of the individual's feelings and salient beliefs towards the object of the behavior. Yet it is not easy to understand the attitude when the knowledge level of the consumer about a product is low, therefore using an appropriate method for measurement is crucial (p. 310). Furthermore, cultural differences are an important determinant of attitudes (Barbarossa et al., 2015). Davis (1989) suggests that pilot interviews are useful to determine general opinions about advantages and disadvantages of the behavior, thus for measuring attitudes, scales can develop through interviews.

Attitude has three dimensions as cognition, affect, and conation according to Sethna and Blythe (2016, p. 307). Cognition indicates the knowledge and conscious

component, affect means the evaluating process, and conation implies intention towards behavior (Sethna & Blythe, 2016, p. 307). Scholars also state that attitude has instrumental, ego-defensive, value-expressive, and knowledge functions (Ling et al., 2015, p. 400; Sethna & Blythe, 2016, p.307). Ling et al. (2015), states that because of the value-expressive function, attitude scales should also measure personal values (p. 400). Consumer knowledge is another aspect of attitude in TPB, which in EVs case indicates the knowledge regarding environmental effects of driving an electric vehicle (Adnan et al., 2017; Rezvani et al., 2015). Considering the relevant literature, it is crucial to inspect attitude as a determining factor of electric vehicle adoption (Adnan et al., 2017; Gallagher & Muehlegger, 2011; Moons & De Pelsmacker, 2015; Wang et al., 2016).

2.2.1.1.2. Subjective Norms

In marketing terms, social norms are formed by the effect of reference groups, which indicates all kinds of real or fictitious influencers on consumer behavior, such as family, friends, and media (Ling et al., 2015). Sethna and Blythe (2016) investigate reference groups' influence in three categories as normative compliance, value-expressive influence, and informational influence. They argue that normative compliance, which works better when social acceptance is very important to a person, is the most effective type of social influences (Sethna & Blythe, 2016). This leads to the opinion that social norms tend to be valued more in collectivist cultures (Y. N. Sang & Bekhet, 2015). In their empirical analyze, Wang et al. (2016) found that subjective norms can be more predictive on intention to adopt HEVs than personal norms, and they argue that China's collectivist culture is the reason of this finding. Since Turkey also is a collectivist country (Hofstede, Hofstede, & Minkov, 2010), social norms can be a powerful predictor of EVs (Kocagöz & Dursun, 2010). In fact, in a cross-cultural automotive consumer study, Deloitte (2014b) reported that generation Y was highly influenced by information sources such as family and friends, articles and reviews, social network sites.

Subjective norms are formed by normative beliefs; the possible effects of approval or disapproval of important others, and personal motivation to comply with

those opinions of others (Ajzen, 1991). Some scholars take social influence as a determining factor of the behavior, instead of subjective norms (Axsen et al., 2013; Y. N. Sang & Bekhet, 2015). Social pressure can also be a significant influencer of the behavior towards green products (Gabler et al., 2013). In their multi-method study regarding battery electric vehicles, Axsen et al. (2013) found that social interactions are highly related to consumer perceptions. Not only friends and family have a social influence, but also, regarding to informational influence, media has an important role in social norms (Sethna & Blythe, 2016). In their research, Moons and De Pelsmacker (2015) tested media and peers as separate social norms and found that media has a more dominant effect on usage intention towards EVs. Moons and De Pelsmacker (2015) explain that relevantly low effect of peers may be caused by EVs' lack of visibility. Similarly, Peters and Dütschke (2014) argue that social norms are more effective on late adopters because they tend to make their decisions based on early adopters' experiences and suggestions. Hence, when EVs can be seen on the streets, the subjective norms would be more powerful for late adopters (Peters & Dütschke, 2014).

2.2.1.1.3. Perceived Behavioral Control

Non-motivational factors such as budget, time, and personal abilities may have an important effect on both intention and behavior as much as personal attitudes and social effects (Ajzen, 1991). Psychological interest on these actual control factors are defined as perceived behavioral control by Ajzen (1991). Bamberg and Schmidt (2003) examined the effects of perceived behavioral control on student car use behavior and found that personal outcomes and perceived external and self-generated social expectations have an impact on behavior. Ajzen (1991) argues that perceived behavior may be influenced by past experiences, social networks, and by actual control over target behavior. In a study investigating usage intentions towards EVs, Moons and De Pelsmacker (2015) separately examined the effect of personal abilities and external factors under the perceived behavioral control, and they didn't find a significant relationship towards usage intention. Wang et al. (2016) used a three item scale for perceived behavioral control factors and reported that there is a significant

effect on adoption intention. Moons and De Pelsmacker's (2015) study is commented by Barbarossa et al. (2017) that the power of perceived behavioral control regarding EVs will get higher at the later stages of diffusion. Consequently, albeit there are some uncertainty about the prediction power of perceived behavioral control on intentions (Kocagöz & Dursun, 2010), using this aspect in different cultures and for different type of behaviors may be helpful for contributing the literature (Barbarossa et al., 2017). Similar to all these indicators, exploratory study showed that instrumental factors are the most important factors on intention to use an electric vehicle. In fact, most of the interviewees answered by instrumental factors such as purchase costs, range, and comfort when directly asked about what would influence their decision to buy or use an EV. Therefore, it is reasonable to take perceived behavioral control of instrumental attributes of an EV as a predictor of usage intention.

2.2.1.1.4. Green Moral Norms

According to Stern (2000), pro-environmental behaviors are mainly based on personal norms. Therefore, Wang et al. (2016) states that personalized moral rules or values should be taken as a discrete factor from subjective norms when investigating the adoption of EVs. In his descriptive article about theory of planned behavior, Ajzen (1991) argues that personal moral issues may have an important role on behaviors, thus adding personal norm factor in TPB model can make a significant contribution. In the same vein, Lane and Potter (2007) argue that relation between personal norms and behaviors is strong when consumers are aware of their responsibilities and consequences of an action as in pro-environmental behaviors. Wang et al. (2016) found that when personal norm was included in the TPB model for intention to adopt HEVs, explained variance was increased by 0.7%. They also found that subjective norms were dominated personal norms, and they explained those results with collectivist culture of China (Wang et al., 2016). In a study combining TPB and NAM(Norm Activation Model), Park and Ha (2014) illustrated the influence of personal norm on recycling intention. Beside all these evidence, Jansson et al. (2017) has shown that when using social and personal norms together in the regression models, personal norms can dominate social norms within the meaning of significance

levels. Overall, these studies highlight the need for using personal norms as a determining factor when examining intention related to pro-environmental behaviors.

Gabler et al. (2013), in their qualitative study based on theory of planned behavior, found a new moderator, perceived green impact which may be helpful to gain better understanding of the behavior towards environmental products. Barbarossa et al. (2015) found that when the green moral obligation of consumers is high, they are more likely to intend to use an electric vehicle. According to exploratory interviews there is still lack of awareness about sustainability issues in Turkey; however, most of the interviewees stated that environmental reasons are important determinants of their electric vehicle preferences. In this research, green moral norms are considered as an element of TPB model extension depending on both exploratory research results and other scholars' findings (Bamberg & Schmidt, 2003; Barbarossa et al., 2015; Wang et al., 2016).

2.2.2. Model and Hypotheses

The main purpose of this study is to answer the question, "What are the determinants influencing consumer usage intention towards electric vehicles in Turkey?". As detailed above, literature and exploratory studies reveal that, attitudes about EVs, subjective norms as friends and family, perceived behavioral control of instrumental attributes of the vehicle, and green moral norms can have an important effect on usage intention. Therefore, the four hypotheses are developed through an extended TPB model, as defined on Figure 1. H1 suggests that, in accordance with Ajzen (1991), general attitudes such as liking or not liking the vehicle, or general believes about whether the vehicle is useful or not affect usage intention. H2 suggests that, the approval of friends and family on the decision to use an EV affects usage intention as also suggested by Axsen & Kurani (2013). This hypothesis is also consistent with exploratory research findings in which majority of the interviewees implicated that other's ideas were important to them. H3 suggests that, one's perception of the external factors such as performance, comfort and looking of the car, and purchase price significantly affect usage intention. Similar to exploratory study findings, several scholars also found that these instrumental factors are the most

effective influencers of usage intention (Barbarossa et al., 2015; Moons & de Pelsmacker, 2015; Wang et al., 2016). Finally, as an extension to general TPB model, H4 suggests that green moral norms of an individual affects usage intention. The idea that personal values are effective predictors of behavior is commonly tested by normative studies (Barbarossa et al., 2017; White & Sintov, 2017). General environmental norms may have not yet reached an important level in Turkish society. Nevertheless, electric vehicles are highly sustainable products, therefore, consumers' travel choice habits and concerns about how their vehicle preferences affect the environment may have an important role on their intention to use an electric vehicle.

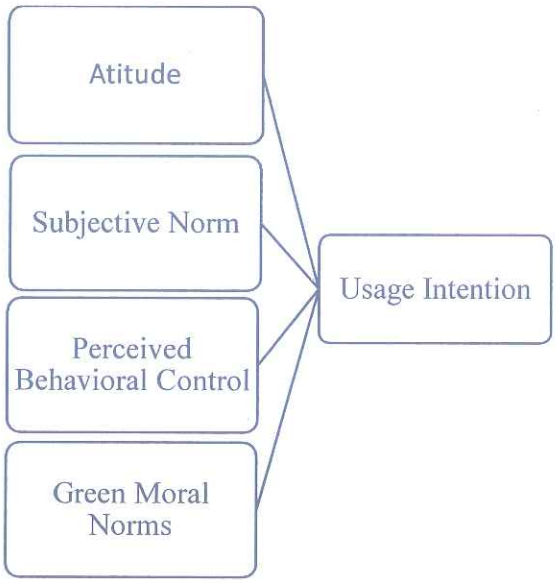

Figure 1: Quantitative Research Model

In the light of this model, the hypotheses are listed below:

H1: More positive attitude towards electric vehicles leads higher intention to use. (+)

H2: Subjective norms (family and friends' approval) affect electric vehicle usage intention. (+)

H3: Perceived behavioral control of instrumental attributes of the electric vehicles affect usage intention. (+)

H4: Consumers' green moral norms are in positive relation with their electric vehicle usage intention. (+)

2.2.3. Sampling and Data Collection

A printed copy of the questionnaire was delivered to 355 participants in March 2018. Convenience sampling method was used for reaching participants in four different University in Istanbul city. Of the total cohort of 355 undergraduate students within the age group of 18-25 (%95.8) and 26-35 (%3.7), 154 were female (%43.4), 178 were male (%50.1), and 23 haven't indicated their gender (%6,5).

Table 9: Gender Frequency Distribution

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	**Male**	**178**	50.1	53.6	53.6
	Female	**154**	43.4	46.4	100.0
	Total	332	93.5	100.0	
Missing	999	23	6.5		
Total		355	100.0		

Frequency of having or not having a driving license is shown by the following table:

Table 10: Table 10: Driving License Frequency Distribution

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	**No**	**122**	34.4	37.0	37.0
	Yes	**208**	58.6	63.0	100.0
	Total	330	93.0	100.0	
Missing	999	25	7.0		
Total		355	100.0		

2.2.4. Measurement

The main purpose of this study is to find the influencing factors of usage intention and to examine their level of effectiveness. In this regard, a questionnaire with the total of 27 items is prepared. Awareness level about electric vehicles was measured by four yes or no questions at the beginning of the questionnaire. Attitude was measured by a semantic differential scale with five items. All other independent

and dependent variables are measured by five-point Likert Scales. All items are adapted from earlier research and necessary changes are made in accordance with the results of qualitative research. At last, age, gender, and driving license were asked as demographic questions. All questions were translated from English to Turkish carefully and checked by a professional who is proficient in both languages and also have the knowledge of questionnaire design. Scales and sources are detailed on Appendix 1.

All analyses were carried out using SPSS (Statistical Package for Social Sciences), version 22.0. First, to understand the sample's awareness level, frequency distributions of four awareness items are tested. Then, after testing the reliability of scales and factor levels of the items, and checking normality of the distributions, multiple regression is used to test four hypotheses. Multiple regression is a method that helps to understand the effect of multiple independent variables and on one dependent variable, and the significance levels of the relations (Field, 2009, p. 209-210). The equation of multiple regression is shown below. Yi represents usage intention as dependent variable and X1, X2, X3, X4 represent dependent variables which are in this case attitude, subjective norm, perceived behavioral control, and green moral norms. B_0 indicates the constant variable and εi is the residual term (Field, 2009, p. 199).

$$Yi = B_0 + \beta_1 X1_i + \beta_2 X2_i + \beta_3 X3_i + \beta_4 X4_i + \varepsilon_i$$

2.2.4.1. Reliability and Factor Analyses

A principal component analysis was conducted on 19 items with varimax rotation. 5 components were developed as expected. %71.5 of total variance was explained by these components. Sampling adequacy was verified by Kaiser-Meyer-Olkin measure, KMO = .844 indicates "great" level (Field, 2009, p. 659). Bartlett's test of sphericity is highly significant ($p<.001$), which means factor analysis is appropriate. Factor loadings after rotations are shown below on the Table 11. As clustered components suggest that component 1 represents attitude, component 2 perceived behavioral control, component 3 green moral norm, component 4 intention, and component 5 subjective norm.

Table 11: Rotated Component Matrix					
	Component				
	1	2	3	4	5
Att2 (Like_Unlike)	.836				
Att4 (Nice_Not Nice)	.805				
Att3 (Clever_Stupid)	.794				
Att1 (Good_Bad)	.775				
Att5 (Usefull_Useless)	.628				
PBC4 (Quality)		.860			
PBC3 (Comfort)		.841			
PBC5 (Performance)		.838			
PBC2 (Design)		.675			
PBC1 (Budget)		.544			
GreenMoral3			.885		
GreenMoral4			.811		
GreenMoral1			.786		
GreenMoral2			.742		
Intention3 (Planning)				.905	
Intention2 (Try)				.872	
Intention1 (Willing)				.471	
SN1 (Friends Support)					.879
SN2 (Family Support)					.839
Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization.					
a. Rotation converged in 5 iterations.					

Afterwards, Cronbach's alpha was tested to analyze the reliability of the scales. All components were found reliable according to their alpha values were higher than .70.

Table 12: Reliability Statistics

Scale	**Number of Items**	**Mean**	**Std. dev.**	**Cronbach's Alpha**
Intention	3	2.452	2.660	0.838
Attitude	5	7.41 (SUM)	2.879	0.842
Subjective Norms	2	2.131	1.642	0.784
Perceived Behavioral Control	5	1.800	3.103	0.847
Green Moral Norms	4	1.748	2.710	0.844

2.2.4.2. Tests of Normality

Normality analyzes through both Kolmogorov-Smirnov and Shapiro-Wilk tests, all variables were found significantly ($p < .001$) non-normal. However, according to George & Mallery (2016), if the skewness and kurtosis levels of a variable is between -1.0 and +1.0, or in some cases between -2.0 and +2.0, then it can be assumed that the distribution is normal (p. 114-115). Hence, as can be seen on Table 13 all variables were distributed normally.

Table 13: Normality Statistics

		Intention	**Attitude**	**Green Moral Norm**	**Perceived Behavioral Control**	**Subjective Norm**
N	Valid	354	320	346	346	355
	Missing	1	35	9	9	0
Skewness		.215	1.099	.629	.659	.410
Std. Error of Skewness		.130	.136	.131	.131	.129
Kurtosis		-.192	.305	-.337	.747	-.058
Std. Error of Kurtosis		.259	.272	.261	.261	.258

2.2.5. Results

2.2.5.1. Awareness Level of the Sample

First, awareness level of the sample was analyzed by frequency distributions. Descriptive tables show that majority of the participants are aware of electric vehicles; however, only %35 of the cohort was closely interested in the EV technology. This means that this sample does not represent innovative people as discussed as the early adopters by Rogers (2003). It is important to underline that media provides information about EVs in Turkey. This result is also consistent with the exploratory study findings, which most of the participants indicate that they've seen EVs on internet or other media channels.

- Are you familiar with electric vehicles?

Table 14: General Knowledge

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No	99	27.9	28.3	28.3
	Yes	251	70.7	71.7	100.0
	Total	350	98.6	100.0	
Missing	999	5	1.4		
Total		355	100.0		

- Have you ever seen any information about electric vehicles on TV or internet?

Table 15: Information Sources

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No	72	20.3	20.6	20.6
	Yes	277	78.0	79.4	100.0
	Total	349	98.3	100.0	
Missing	999	6	1.7		
Total		355	100.0		

- Have you ever seen an electric vehicle?

Table 16: Visibility

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No	126	35.5	36.1	36.1
	Yes	223	62.8	63.9	100.0
	Total	349	98.3	100.0	
Missing	999	6	1.7		
Total		355	100.0		

- Are you following the electric vehicle technology?

Table 17: Interest

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No	222	62.5	63.6	63.6
	Yes	127	35.8	36.4	100.0
	Total	349	98.3	100.0	
Missing	999	6	1.7		
Total		355	100.0		

2.2.5.2. Regression Analysis for Hypotheses Test

According to correlation matrix, with the number of 306 cases contributed, all coefficient values are lower than 0.90, which means there are no multicollinearity between predictors (Field, 2009, p. 233). Another important point of the matrix is, of all the predictors, perceived behavioral control correlates best with intention ($r = .497$, $p < .001$).

Table 18: Correlations						
		INT	ATT	GMN	PBC	SN
Pearson Correlation	INT	1.000	.389	.293	.497	.345
	ATT	.389	1.000	.282	.430	.370
	GMN	.293	.282	1.000	.247	.262
	PBC	.497	.430	.247	1.000	.378
	SN	.345	.370	.262	.378	1.000
Sig. (1-tailed)	INT	.	.000	.000	.000	.000
	ATT	.000	.	.000	.000	.000
	GMN	.000	.000	.	.000	.000
	PBC	.000	.000	.000	.	.000
	SN	.000	.000	.000	.000	.
N	INT	306	306	306	306	306
	ATT	306	306	306	306	306
	GMN	306	306	306	306	306
	PBC	306	306	306	306	306
	SN	306	306	306	306	306

R square of the total model is .315, therefore these predictors can explain %31.5 of usage intention toward EVs in Turkey. Adjusted value of R Square is .306, which means, since there is no big difference between adjusted R^2 and R^2, cross-validity of the model is very good (Field, 2009, p. 235).

Table 19: Model Summary			
R	R Square	Adjusted R Square	Std. Error of the Estimate
.561[a]	.315	.306	.69589

Variance analysis (ANOVA) indicates that model is significant ($p < .001$) to predict the dependent variable.

Table 20: ANOVA Results

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	67.072	4	16.768	34.626	.000[b]
	Residual	145.762	301	.484		
	Total	212.834	305			

a. Dependent Variable: Intention

b. Predictors: (Constant), Subjective Norm, Green Moral Norm, Perceived Behavioral Control, Attitude

As the coefficients table shows, all predictors have significant ($p < .05$) and positive relationship with the dependent variable. Therefore H1, H2, H3, H4 hypotheses are all supported. The final equation for usage intention is therefore as follows:

$$\text{Usage Intention}_i = B_0 + \beta_1 \, ATT_i + \beta_2 \, GMN_i + \beta_3 \, PBC_i + \beta_4 \, SN_i + \varepsilon_i$$

$$\text{Usage Intention}_i = 0{,}625 + (0{,}156)ATT_i + (0{,}131)GMN_i + (0{,}352)PBC_i + (0{,}120)SN_i + \varepsilon_i$$

Table 21: Coefficients

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	.625	.159		3.927	.000
	Attitude	.227	.080	.156	2.825	.005
	Green Moral Norm	.165	.064	.131	2.575	.010
	Perceived Behavioral Control	.490	.077	.352	6.398	.000
	Subjective Norm	.128	.058	.120	2.224	.027

a. Dependent Variable: Intention

Overall, these results indicate that there are significant relationships between usage intention and attitude, perceived behavioral control, subjective norms, and green moral norms. As both correlation and coefficient table show, the best predictor of usage intention is perceived behavioral control, following by attitudes. However, the total prediction power of the model is not so strong (F-ratio = 34.626, $R^2 = .315$), which reveals that there may be different significant predictors that influence usage intention ($B_0 = .625$).

CHAPTER THREE
DISCUSSION

3.1. General Discussions

As a sustainable product, electric vehicles are needed to be promoted to contribute on protecting environment. Nevertheless, such high-involvement innovations are not easy to widespread without understanding consumer needs. Investigating the main influencers of intention can be valuable in designing marketing strategies. In this regard, the present study was purposed to examine the determinants of consumers' usage intention towards EVs in Turkey. As Peters and Dütschke (2014) suggested, it is beneficial to compare actual users and other groups. However, it was not possible to reach a sufficient sample of actual users in Turkey in the current situation. Therefore, using qualitative methodology, an exploratory study was conducted with 10 actual users of different kinds of EVs in the first part of the research to better understand cultural aspects of the most important factors that derived from secondary data. After analyzing both primary and secondary data findings, a quantitative survey method was applied to 355 undergraduate students in Istanbul. Even though there weren't significant differentiations from other cultures, small changes were needed in some of the scales due to the very early stage of market.

Consistent with the literature, in both part of the research, instrumental attributes were found as the most effective determinant of usage intention. In quantitative research, participants were asked about instrumental factors such as price, comfort, design, quality, and performance. It was found that these attributes of the electric vehicles were significantly related with intention to use. During interviews, instrumental attributes of the electric vehicles were comprehensively discussed. Similar to main research findings, purchase price is the most important factor for the majority of users. According to these data, it can be inferred that, lack of models in Turkey, and their relatively high prices may be a major obstacle for diffusion of EVs.

Another important finding from interviews was, when comparing EVs with conventional cars, range anxiety is also an imperative factor. Range anxiety is a commonly discussed aspect in electric vehicle literature. However, due to the continuous developments in technology, it will not be a major barrier in near future.

For this reason, it is assumed that to further examine the range anxiety in quantitative research of the present study would be unnecessary.

Despite the negative effects of purchase costs, present study revealed that technological and ecological features of electric vehicles are very influential to a group of consumers. Some scholars examined these consumer groups by normative studies as the early adopters (Carley et al., 2013; Schuitema et al., 2013). This research has shown that positive technological aspects of the electric vehicles, such as noise, regenerative break, gear system, and performance attributes can provide a positive intention towards EVs. Future research can examine these aspects more elaborately especially through the eyes from technology and car enthusiast consumers.

Moreover, environmentalists have been discussed as the early adopters of EVs by several scholars (Barbarossa et al., 2017; Schuitema et al., 2013) because the main reason of this innovation is protecting environment. In this thesis it was tried to examine Turkish consumers' environmental norms. Despite that green moral norms are found as a significant predictor of usage intention, both the low prediction power of the determinant and in-depth investigation by interviews show that environmental awareness is limited by a niche group of consumers in Turkey. Caring about environment and developing norms are in relation with positive emotions towards the target green product, as found by several scholars (Moons & de Pelsmacker, 2012; Rezvani, Jansson, & Bengtsson, 2017; Rezvani et al., 2015; Schuitema et al., 2013). Future studies can investigate emotions towards electric vehicles in Turkey. But for an appropriate research about emotions, it is required for consumers to see more electric vehicles on the streets. Taken together, environmental attributes of the electric vehicles may not be the most influential aspect for marketing for the first stage of adoption.

In the exploratory study, social interactions have been found to be very important for the actual users of electric vehicles in Turkey. Using a prestigious car is an important status symbol. Correspondingly, most of the users criticized BMW i3 model for looking "odd" than the conventional models, for as much as BMW brand usually has a prestigious perception in Turkey. Furthermore, direct expressions of other people are also of particular importance to users. These findings led to the hypothesis that subjective norms derived from family and friends may have an imperative role on usage intention. However, even though the significance level made

the hypothesis acceptable, the prediction power is lower than the expected levels. This result is likely to be related to age range of the quantitative study's sample group, or it may be due to the response bias and limitations of survey design. To develop a full picture of subjective norms in Turkey, additional studies are required.

3.2. Marketing Suggestions

As highlighted in the literature review section, promoting green products is an efficient way for differentiation strategies of companies. Furthermore, following the new technologies is a crucial asset for both brands and governments. Despite the widespread campaigns through the world, electric vehicles are not sufficiently promoted in Turkey. In fact, there are only a few EV models of the famous brands in Turkey, even though they reach very good sales in different countries. To protect the environment, innovation of EVs should achieve a dominant role in automobile market of all the world. Governments and brands should take responsibility in this regard. For contributing the existing marketing literature of EVs, this thesis aimed to reveal Turkish consumers' barriers and influencers towards usage intentions.

Since EVs are high involvement products (Garling & Thogersen, 2001), the most important aspects are costs and savings of EVs for a Turkish consumer due to high prices of cars and fuels. However, as suggested by Dahlstrom (2011), companies should point out the good features of this kind of green products (p. 204). Findings of this thesis supported that for a typical consumer in Turkey, environmentalism is not the most important benefit of EVs. Emphasizing on technological assets, on the other hand, may have a stronger effect on consumer attitudes. To highlight the positive aspects such as ease of use, comfort, and fast accelerating, brands should organize some campaigns. Further suggestions about campaign practices from all around the world is discussed by a comprehensive literature review of Jin and Slowik (2017).

Results of the awareness analyze in the quantitative research have shown that there is a growing awareness about EVs in Turkey. According to exploratory study implications, this result may be caused by recent news about government domestic car project or increasing worldwide popularity of Tesla brand. In fact, most of the interviewees tend to discuss about domestic car or Tesla when asked about their general opinions about EV technology. There are also some other explanations for the

growing awareness in Turkey. For example, turquoise taxi project, which promotes electric taxis in Istanbul supported by Istanbul Chamber of Taxi Drivers (İTEO), was a good attempt to create consumer awareness. However, driving an electric vehicle is different than just using it as a passenger due to technological features. For expanding trialability, brands can promote electric vehicles by encouraging customers to renting or leasing options. Considering social influence effects, word of mouth strategies can also be effective.

3.3. Limitations and Future Research

Due to the early stage of electric vehicle innovation, especially in Turkey, it is not so convenient to inspect the actual behavior to use or purchase. However, future studies may reach a larger sample of electric vehicle drivers in Turkey to further analyze the determinants of behavior. Long-term exploratory qualitative studies which give participants the opportunity to try electric vehicles may provide a better understanding on barriers against electric vehicle adoption.

Targeting early adopters is a good way to develop effective marketing strategies (Dahlstrom, 2011; Rogers, 2003). In the qualitative part of this study, it was found that most of the reached users describe themselves as either innovative or environmentalist people. However, by the reasons of sales numbers and time limitations, it wasn't feasible to reach a sufficient sample of actual users. Future research can compare actual users to other groups for detecting the target consumers. Stern (2000) suggests that every target's behavior should be separately analyzed. Furthermore, different age groups might get examined separately in terms of the reasons of the intentions towards electric vehicles. In fact, it has been found that sustainability awareness and importance of influencers is in relation with age (Johnstone & Lindh, 2018).

Another important weakness of this study lies behind the criticism of social cognition models, as in this case; theory of planned behavior. It is not clear that if any kind of data would cause this model to be rejected. Therefore, the model cannot be tested properly, which causes week validity of it (Ogden, 2003). In fact, when tested separately in a linear regression model, perceived behavioral control of the instrumental attributes were found to have a stronger power to predict intentions than

in the actual model (B=.504). Hence, for a deeper understanding of intention and behavior, and for redirecting the consumer behavior to more sustainable consumptions, these kind of theories alone are not enough. Normative theories such as norm activation model (NAM) or value-belief norm theory (VBN) can be used with the TPB model to examine the actual determinants of sustainable behavior.

3.4. Conclusion

The purpose of the current study was to determine the factors of consumer usage intention towards electric vehicles in Turkey. The results of this investigation show that attitudes, subjective norms, perceived behavioral control, and green moral norms all affect usage intention. Perceived behavioral control of the instrumental attributes of the vehicles is the most important determinant. The findings of this research provide insights for marketing literature. This thesis has been one of the first attempts to thoroughly examine consumer intentions towards EVs in Turkey. The major limitation of this study was to reach a good sample of actual users due to the current low sales. For overcoming this limitation's consequences, both qualitative and quantitative methods were conducted in the light of international literature. Considerably, more studies will need to be done to contribute the diffusion of electric vehicles in Turkey.

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Appendix 1: Questionnaire

Awareness	
Four Yes/No items. Adapted from Carley et al. (2013).	
AW1	Elektrikli arabalar hakkında genel bilginiz var mı? (Are you familiar with electric vehicles?)
AW2	TV veya internette elektrikli arabalar hakkında bir bilgiye rastladınız mı? (Have you ever seen any information about electric vehicles on TV or internet?)
AW3	Daha önce hiç elektrikli bir araba gördünüz mü? (Have you ever seen an electric vehicle?)
AW4	Elektrikli araba teknolojisini takip ediyor musunuz? (Are you following the electric vehicle technology?)
Attitude	
Five semantic differential items with five-point scales. Adapted from Moons & De Pelsmacker (2015).	
ATT1	İyi/Kötü (Good/Bad)
ATT2	Sevdim/Sevmedim (Like/Don't Like)
ATT3	Akıllıca/Aptalca (Clever/Stupid)
ATT4	Güzel/Güzel Değil (Nice/Not Nice)
ATT5	Kullanışlı/Kullanışlı Değil (Useful/Useless)
Intention	
Three items with five-point Likert Scale 1=Totally Agree, 5=Totally Disagree. Adapted from Wang et al. (2016).	
INT1	Önümüzdeki birkaç yıl içerisinde elektrikli araba kullanmak isterim. (I am willing to use an EV in the near future.)
INT2	Önümüzdeki birkaç yıl içerisinde elektrikli araba kullanmayı deneyeceğim. (I will try to use an EV in the near future.)
INT3	Önümüzdeki birkaç yıl içerisinde elektrikli araba kullanmayı planlıyorum. (I am planning to use an EV in the near future.)
Perceived Behavioral Control	
Five items with five-point Likert Scale 1=Totally Agree, 5=Totally Disagree. Adapted from Moons & De Pelsmacker (2015), Steg (2005), Wang et al. (2016).	
PBC1	Fiyatı bütçeme uygun olursa elektrikli araba kullanabilirim. (I can use an EV if the purchase price is affordable for my budget.)

PBC2	Dış görünüşü güzel olursa elektrikli araba kullanabilirim. (I can use an EV if it looks good.)
PBC3	Alıştığım konforu sağlarsa elektrikli araba kullanabilirim. (I can use an EV if it ensures the comfort that I am used to.)
PBC4	Kalitesi yeterince iyi olursa elektrikli araba kullanabilirim. (I can use an EV if the quality is good enough.)
PBC5	Performansı alıştığım seviyede olursa elektrikli araba kullanabilirim. (I can use an EV if the performance is at the level I am used to.)
Subjective Norm	
Two items with five-point Likert Scale 1=Totally Agree, 5=Totally Disagree. Adapted from de Groot & Steg (2007).	
SN1	Arkadaşlarım elektrikli araba kullanmakla ilgili fikrimi destekleyecektir. (My friends would support my opinion about using an EV.)
SN2	Ailem elektrikli araba kullanmakla ilgili fikrimi destekleyecektir. (My family would support my opinion about using an EV.)
Green Moral Norm	
Four items with five-point Likert Scale 1=Totally Agree, 5=Totally Disagree. Adapted from Barbarossa et al. (2015).	
GMN1	Kullandığım arabanın çevreye olan etkisi benim için önemlidir. (It is important to me how my car usage may affect the environment.)
GMN2	Kullandığım arabanın hava kirliliği yaratmasını istemem. (I don't want my car to cause air pollution.)
GMN3	Çevreye fazla zarar veren bir araba kullanmak bana göre çok yanlıştır. (To use a car that damages the environment is very wrong for me.)
GMN4	Çevreye zarar veren bir araba kullanmak prensiplerime aykırıdır. (Using a car that harms the environment is against my principles.)
Demographics	
Age	18-25, 26-35, 36-45, 46-55, 56 and older
Gender	Female/Male
Driving Licence	Yes/No