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Key Factors Influencing Consumers' Purchase of Electric Vehicles

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Abstract: Although the rapid progress of the global economy and technology has advanced human civilization, it has also caused tremendous damage to the global ecological environment. Therefore, humans are thinking seriously about the environment and its sustainable development. One of the solutions to environmental problems is new energy vehicles. Since the promulgation of the "Energy Saving and New Energy Vehicle Industry Development Plan (2012–2020)" by the General Office of the State Council, the Chinese government has determined a strategy of pure electric driving technology. The electric vehicle market in China has expanded rapidly, making China the largest electric vehicle market in the world. Hence, research on the situation of electric vehicles in China is highly necessary and of reference value for other countries to develop electric vehicles. As a result, it is a critical issue to develop low-carbon, energy-saving, and intelligent electric vehicles to reduce the environmental impact. This paper establishes a theoretical framework based on the theory of planned behavior (TPB), technology acceptance model (TAM) and innovation diffusion theory (IDT), and explores the key factors influencing consumers' purchase of electric vehicles. The results show that: The application of the key factor model constructed in this study to consumers' behavioral intention regarding electric vehicle purchase is acceptable. According to the structural equation modeling (SEM) analysis results, (1) In terms of behavioral intention: Consumers' control over the resources required to purchase electric vehicles has the highest influence on their behavioral intention, while consultation opinions from consumers' surroundings also significantly affect their behavioral intention to purchase electric vehicles. In addition, consumers' environmental awareness and acceptance of technology products will also influence their behavioral intention. (2) In terms of attitude toward behavior: When consumers believe that electric vehicles are more beneficial at the individual, environment or national level, or they believe that the usage of electric vehicles is simpler and more convenient, they will show a more positive attitude towards the purchase of electric vehicles. Consumers consider electric vehicles as forward-looking technology products with similar driving operation and usage cost compared to traditional vehicles. (3) In terms of regulations: The opinions of consumers' family members, friends, colleagues or supervisors do not significantly affect the attitude or behavior of consumers regarding electric vehicle purchase. The key factors influencing consumers' purchase of electric vehicles are not only applicable to the design and development of electric vehicles that better suit consumer demands, but also serve as a theoretical basis for the popularization of electric vehicles, and provide a reference for consumers' choice and purchase. Therefore, the government and relevant manufacturers need to consider increasing the publicity of electric vehicles and launch more attractive battery and charging schemes to attract consumers and promote the sustainable development of the automobile industry.

Keywords: electric vehicles; TPB; TAM; IDT; structural equation model

1. Introduction

1.1. Research Background and Motivation

Although the rapid progress of the global economy and technology has advanced human civilization, it has also caused tremendous damage to the global ecological environment [1]. As the largest oil importer in the world [2], China urgently needs alternative energy solutions. However, solar energy, hydrogen fuel, and nuclear power are technologically complex and cannot achieve mass production in a short time. Electric energy, as a feasible energy solution at present, can solve the country's dependence on oil resources to a certain extent [3]. One of the important reasons for environmental pollution is the large increase in car ownership and usage [4]. According to statistics from the International Energy Agency (IEA), there are currently about 1 billion vehicles in the world, which consume about 60 million barrels of oil per day (about 70% of total oil production); private vehicles consume an average of about 36 million barrels of oil per day, while emitting 14 million tons of carbon dioxide [5]. Therefore, one of the solutions to environmental problems is to replace traditional vehicles with new energy vehicles [6]. Since the promulgation of the "Energy Saving and New Energy Vehicle Industry Development Plan (2012–2020)" by the General Office of the State Council, the Chinese government has determined a strategy of pure electric driving technology. The electric vehicle market in China has expanded rapidly, making China the largest electric vehicle market in the world [7,8]. Hence, research on the situation of electric vehicles in China is highly necessary and of reference value for other countries to develop electric vehicles.

From an energy perspective, more abundant energy sources for vehicles will improve the reliability and balance of energy consumption. Coupled with the intelligent development of electric vehicles, traffic status and road usage will be significantly improved [9]. The IEA (2017a) has indicated that, based on vehicle fuel cycle calculations, electric passenger vehicles in Europe in 2015 emitted 50% less carbon dioxide than gasoline vehicles and 40% less carbon dioxide than diesel vehicles. When emissions related to vehicle manufacturing are considered, carbon dioxide emissions are reduced [10]. However, Ellingsen et al. clearly stated that, considering the full life cycle of vehicles (manufacture, usage, and scrap), under the current European electricity production structure, pure electric vehicles can reduce greenhouse gas emissions by about 30% compared to internal combustion engine vehicles. For countries with carbon-intensive power production structures (such as India and China), with the full life cycle of vehicles considered, the reduction may even be greater [11].

With the dual pressure of resource reduction and environmental changes, electric vehicles will become the mainstream development trend of the future automotive industry. Therefore, it is a critical issue to develop low-carbon, energy-saving, and intelligent electric vehicles to reduce environmental impact. This paper studies consumers' opinions of electric vehicles in an uncertain environment, and analyzes the factors influencing consumers' acceptance of electric vehicles, in order to improve the penetration of electric vehicles into the market and to provide reference suggestions for future researchers.

1.2. Research Purpose

When consumers make purchase decisions, they face more alternatives due to information exchange, and the aspects that they value during purchase are also varied [12]. Although the popularity of electric vehicles is increasing, the market ratio of electric vehicles is still very low. Consequently, the key to this study is to investigate how to make consumers better accept electric vehicles, and explore the conditions which influence consumers' acceptance of electric vehicles. Therefore, based on the above research background and motivation, this study aims to investigate the factors influencing consumers' purchase of electric vehicles in order to provide a reference for the design and development of electric vehicles and offer suggestions for companies regarding future consumer purchases of electric vehicles. The main contents of this study are as follows:

1. We review and discuss related literature, make necessary revisions according to the research results of previous scholars, establish the theoretical framework of factors influencing consumers' purchase of electric vehicles, and propose statistical hypotheses from different dimensions.
2. We design questionnaires, conduct surveys, analyze the questionnaires' reliability and conduct project analysis, according to the theoretical framework of factors influencing consumers' purchase of electric vehicles.
3. We establish a structural equation model based on the theoretical framework, conduct confirmatory factor analysis (CFA) on the data collected from the formal questionnaire, and analyze the convergence validity and discriminant validity to verify the applicability of the model.
4. We verify the statistical hypotheses across the dimensions using the structural equation model, and identify the key factors influencing consumers' purchase of electric vehicles.

1.3. Research Scope and Limitations

According to the energy source, vehicles are divided into traditional internal combustion engines and new energy vehicles. Vehicles that do not rely on gasoline and diesel sources can be referred to as new energy vehicles, including natural gas vehicles (NGV), fuel cell vehicles (FCV), hybrid electric vehicles (HEV) and electric vehicles (EV). However, this study only focuses on private electric vehicles to explore the key factors influencing consumers' purchase of new energy vehicles. As the research scope of this study is China's electric vehicle market, only Chinese consumers were selected as research subjects.

2. Literature Review

2.1. Development of Electric Vehicles

According to statistical data from the IEA (International Energy Agency) in 2018, over 1 million electric vehicles were sold in 2017, which showed a 54% increase from 2016. In addition, after the global sales volume of electric vehicles exceeded 1 million in 2015 and 2 million in 2016, the global stock of electric vehicles in 2017 exceeded 300 million, which showed a 56% increase from 2016, and China ranked first with a 40% share, as shown in Figure 1 [13].

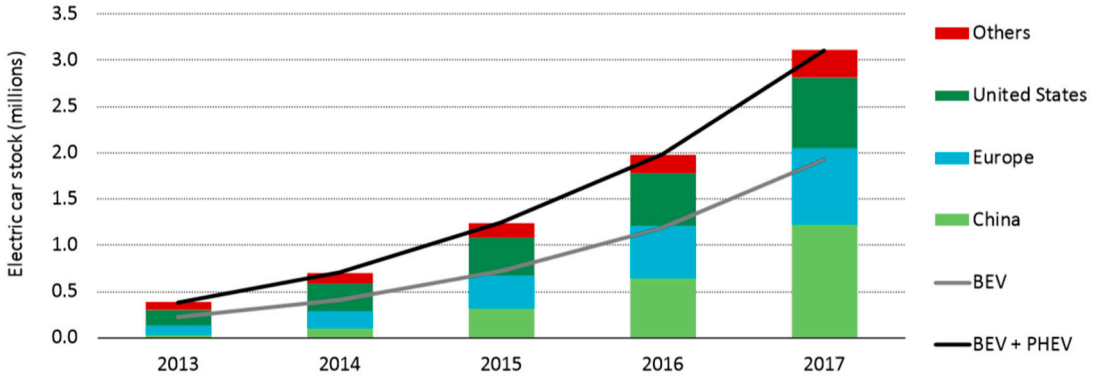

Figure 1. Evolution of global electric vehicle stock, 2013–2017 (IEA, 2018).

The EV30@30 campaign was launched at the Eighth Clean Energy Ministerial in 2017, with the goal of increasing the market share of electric vehicles in all the member countries of EVI (Electric Vehicles Initiative) to 30% by 2030 [14]. The challenge involves achieving improvement in the global ownership of electric vehicles, the development of related battery production technology and material requirements, the deployment of charging facilities for electric vehicles, energy and fuel conservation, the reduction of greenhouse gas emissions and other measures beneficial for sustainability.

With this background, more governments are planning development goals related to electric vehicles, sending more clear signals to vehicle manufacturers and other stakeholders, and enhancing

their confidence in the future policy framework. In addition, some countries have announced plans to ban internal combustion engine vehicles, which marks an important step in the development of electric vehicles, as shown in Figure 2 [15].

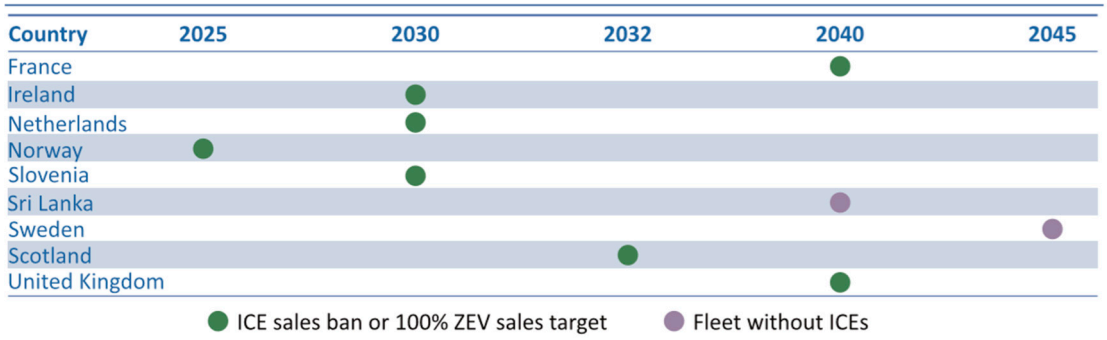

Figure 2. Announced sales bans for internal combustion engine (ICE) vehicles (Source: [13,15]).

Driven by government policies, the electric vehicle market has developed sharply in China since 2011, making China the world's largest electric vehicle market, as shown in Table 1. The sales volume of electric vehicles keeps growing, but the market share of electric vehicles is still very low. In 2017, the market share of electric vehicles in China was only 2.7% [16].

Table 1. 2011–2017 sales of EVs (electric vehicles) in China. (Source: [16]).

Year	Sales of EVs	Year-on-Year Growth (%)	Total Car Sales (104 Cars)	Year-on-Year Growth (%)	The Proportion of EVs (%)
2011	8159		1850.51	2.46	0.044
2012	12,791	56.77	1930.64	4.33	0.066
2013	17,600	37.60	2198.41	13.87	0.080
2014	74,763	324.79	2349.19	6.86	0.318
2015	331,092	342.86	2459.8	4.71	1.346
2016	507,000	53	2802.8	13.7	1.8
2017	777,000	53.25	2887.89	3.04	2.7

Data source: China Auto Industry Association.

In addition to government policies, global automakers have also supported the development of the electric vehicle industry with practical actions. By 2018, almost all the major automakers around the world had expressed their ambitions or plans to develop electric vehicles. In February 2017, Daimler AG declared that in the future, the Smart will focus on electric vehicles in the United States and Canada markets. In July 2017, VOLVO declared that it will only produce pure electric vehicles and hybrid electric vehicles from 2019. In 2016, HONDA declared that by 2030, 2/3 of the company's vehicle sales will be electric vehicles. Toyota also declared that it will stop selling diesel vehicles in Europe by the end of 2018 [13].

Due to the booming development of the electric vehicle industry, in recent years, researchers in China and abroad have paid more attention to purchase behaviors and intentions related to electric vehicles. In the fourth quarter of 2011, the German RWE Group surveyed 6421 consumers from 12 global auto markets, 502 of whom were from China. Research shows that Chinese consumers will be the second most willing to buy EVs after Indian consumers. The main motivation for 40% of consumers' purchase of electric vehicles is energy conservation and environmental protection. The most significant concern for consumers is vehicle charging [17]. Although government subsidies can stimulate consumers' willingness to buy electric vehicles to some extent, the effect is relatively weak. For consumers with a low annual household income, and a higher awareness of preferential policies and high environmental protection, government subsidies would have a more obvious effect [18]. Consumers attach great importance to price, but also pay attention to interior trims, storage space

and the engine performance of vehicles. In terms of market share, consumers with higher education prefer hybrid vehicles [19]. People from higher social strata and in possession of modern values have a higher willingness to buy electric vehicles. As Ma and Feng said, "Travel demand, environmental awareness, living conditions and purchasing psychology have influences on consumers' purchase intentions due to external environment considerations." [20].

2.2. Theory of Planned Behavior

The Theory of Planned Behavior (TPB) was proposed by Ajzen based on the Theory of Reasoned Action (TRA) [21], but it differs in that TPB contains the perceived behavioral control dimension (PBC), which is used to explain the limitations of TRA. TRA is based on a relationship between attitude toward behavior (ATB), behavioral intention (BI), and actual behavior [22]. Then, through continuous development and verification, the subjective norm dimension (SN) was added to construct a complete TRA model [23].

According to TRA and TPB, certain behaviors of individuals are determined by their "behavioral intention", which is simultaneously influenced by the "attitude" and "subjective norm" of individuals regarding a specific behavior. Behavioral intention measures the individual's willingness to engage in a particular behavior [24], while subjective norm refers to the expected social pressure that an individual receives upon performing a behavior. When the subjective norm is more strongly influenced, it has a greater impact on behavioral intention [23]. Perceived behavioral control measures the expected process control of individuals when participating in a behavior, namely the difficulty experienced when participating in a behavior. This factor reflects the resources and opportunities of individuals to engage in the behavior [21]. Therefore, TPB advocates that in addition to attitude toward behavior and subjective norm, perceived behavioral control also affects behavioral intention, as shown in Figure 3.

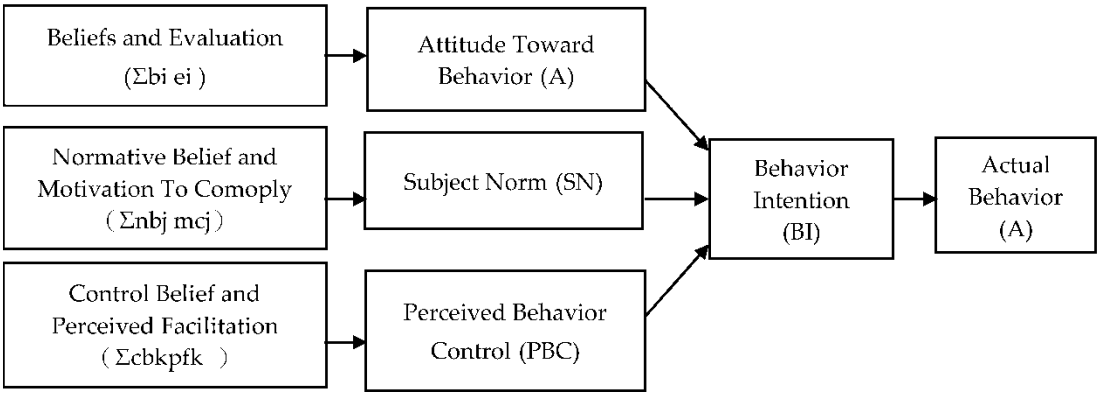

Figure 3. Theory of Planned Behavior (Source: [21]).

Bhattacherjee divided the reference group into interpersonal influence and external influence in a study on the service of ordering e-securities online. Interpersonal influence refers to the effects of oral accounts by superiors, peers, and those who have adopted innovation. External influence refers to mass media reports, expert opinions, and other non-interpersonal information [25].

Ajzen divided perceived behavioral control into two factors: Self-efficacy and facilitating conditions [21]. Bhattacherjee also believed that self-efficacy is an intrinsic factor, facilitating conditions are an external factor [25]. In 2006, Ajzen proposed that perceived behavioral control is similar to self-efficacy in a broad sense [26]. In addition, other scholars regarded perceived behavioral control as a determinant of intention and interpreted it as self-efficacy [27] in their discussion of the health belief model [28], protection motivation theory [29], and the health action process approach [30]. However, Ajzen proposed that perceived behavioral control can be interpreted as the definition of facilitating conditions in the model of interpersonal behavior [19], which differs from earlier research perspectives.

2.3. Technology Acceptance Model (TAM)

The Technology Acceptance Model (TAM) was proposed by Davis in 1989, derived from the Theory of Reasoned Action proposed by Ajzen and Fishbein [31], and aims to assess or interpret the usage behavior of information technology users [32]. Legris et al. showed that the technology acceptance model can roughly explain how external factors influence the internal "attitude", "belief", and "behavioral intention" [33]. Davis proposed dimensions of perceived usefulness (PU) and perceived ease of use (PEU) to explain and predict an individual's acceptance of technology and to analyze the factors influencing an individual's acceptance of new information [32].

TAM considers perceived usefulness and perceived ease of use as independent variables, while it regards user attitude, behavioral intention, and usage behavior as dependent variables. It advocates that perceived usefulness and perceived ease of use will affect the attitude regarding technology usage, and thus influence the specific behavior. As a means of explaining user attitude and behavioral intention, perceived usefulness and perceived ease of use will also be affected by external variables. The technology acceptance model is shown in Figure 4.

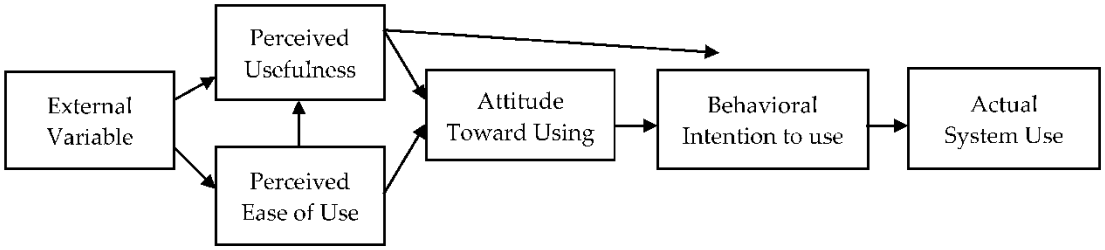

Figure 4. Technology Acceptance Model [32].

In addition, the influence of external variables is also discussed in the model. Perceived ease of use is defined as the individual's opinion of the difficulty of using a particular system. Perceived usefulness is defined as the individual's belief in the improvement effects of the new system on work efficiency. Perceived ease of use affects the user's perceived usefulness of new technologies, and the two are positively related.

2.4. Innovation Diffusion Theory (IDT)

The Innovation Diffusion Theory (IDT) was proposed by Rogers in 1983 [34] to predict and explain how users adopt innovations [35]. For consumers and users, new ideas, products, services or experiences are "innovations" [36]. Rogers believed that innovation diffusion consists of innovation, communication channels, social systems, and time, and refers to the members within a social system communicating a certain innovative message to each other over time, through a specific communication process in the system called the "innovative decision-making process" [34,37]. The process can be divided into the perception, persuasion, decision-making, implementation, and confirmation stages.

In addition, Rogers proposed that the innovation decision-making process will be influenced by the decision-making subject, which means that the individual's or organization's perception of the innovation characteristics greatly affects the acceptance of innovation, including the following five points [30]:

1. Relative Advantage: Refers to the advantages of innovation compared to old products and technology.
2. Compatibility: Refers to the match of the new technology or consumer product experience with previous experience. A higher match means that the new technology or product is more easily accepted [38].
3. Complexity: Refers to the difficulty of understanding and using innovation. A higher difficulty means that the innovation is less easily accepted.

4. Trialability: Refers to consumers' opportunities to experience or test the effects of innovation through a trial, in order to improve their purchase or acceptance willingness.
5. Observability: Refers to the possibility of observing the innovation after usage, which contributes to the spread of innovation.

Tornatzky and Klein pointed out in their study that only Relative Advantage, Compatibility, and Complexity are related to innovation [39]. Moore and Benbasat argued that relative advantage is similar to the perceived usefulness in TAM, and that complexity is similar to the perceived ease of use in TAM [40]. Chen et al. also believed that compatibility has a significant positive impact on consumer attitudes toward technology [41].

3. Research Structure and Method

3.1. Research Structure

Since the electric vehicle is a new type of personal vehicle with green technology, the consumer behavior of buying electric vehicles is regarded as an innovative behavior. Previous theoretical studies on technology acceptance, purchase behavior, and innovation have usually adopted TPB proposed by Ajzen (1985) [21], TAM proposed by Davis (1989) [32], and IDT proposed by Rogers (1995) [37]. Based on the literature review, this study integrates the three theories to construct the model. According to TPB, the key factor influencing the actual usage behavior of consumers is the behavioral intention; the purchase intention is influenced by attitude, subjective norm, and perceived behavioral control [21]. In TAM, the two variables influencing attitude are perceived usefulness and perceived ease of use [38]. According to Taylor and Todd [42], compatibility is also one of the variables affecting attitude. In addition, according to Agarwal and Prasad, personal innovativeness affects an individual's perceptions of information technology innovation [43]. According to Bhattacherjee [25], consumers form evaluations based on interpersonal influence and external influence, which are regarded as variables that influence the subjective norm. Ajzen proposed that perceived behavioral control is highly similar to self-efficacy, and interpreted self-efficacy as a facilitating condition in the model of interpersonal behavior [26]. Therefore, this study considers that self-efficacy, facilitating condition, and perceived behavioral control are moderately or highly correlated, which will form a higher common factor. This factor is named as self-control ability (SCA) to form a second-order model. Therefore, the research architecture of this study is shown in Figure 5.

3.2. Research Hypothesis

This study proposes several research hypotheses regarding the factors influencing consumers' acceptance of electric vehicles, based on the previous discussion.

3.2.1. Purchase Intention

Purchase intention refers to an individual's tendency to take specific actions and can be measured by the individual's possibilities of taking specific actions. As discussed in Chapters 2 and 3.1, the main factors determining behavioral intentions are classified as attitude toward behavior, subjective norm and self-control ability [26,42], all of which are significantly positively correlated with behavioral intention [21]. Therefore, this study hypothesizes that attitude toward behavior, subjective norm, and self-control ability have positive impacts on consumers' behavioral intention regarding electric vehicles.

Hypothesis 1. Consumers' attitude toward electric vehicles has a significantly positive impact on their purchase intention.

Hypothesis 2. Consumers' subjective norm regarding electric vehicles has a significantly positive impact on their purchase intention.

Hypothesis 3. Consumers' self-control ability regarding electric vehicles has a significantly positive impact on their purchase intention.

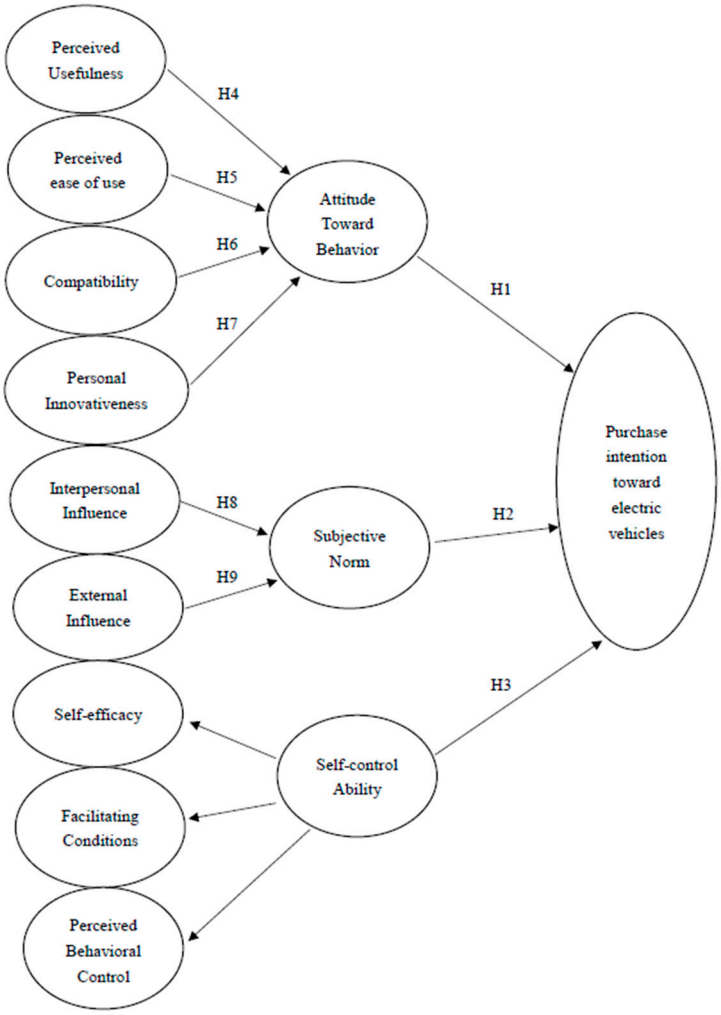

Figure 5. Research structure.

3.2.2. Attitude toward Behavior

Attitude is an individual's inner experience in relation to a behavioral tendency. Tylor and Todd pointed out that relative advantage is positively related to attitude; complexity is negatively related to attitude; and compatibility is positively related to attitude [34,39,40,42]. Specifically, relative advantage has the same meaning as perceived usefulness; complexity has the same meaning as perceived ease of use [34]. According to IDT, attitude toward behavior is deconstructed into four exogenous variables:

1. Perceived usefulness: Interpreted in this study as consumers' perception of the efficiency of electric vehicle functions.
2. Perceived ease of use: Interpreted in this study as consumers' ability to learn the operation of electric vehicles and use electric vehicles without too much effort.
3. Compatibility: Interpreted in this study as the adaptation of consumers to electric vehicles, which means that consumers do not need to adapt themselves to new products (electric vehicles).
4. Personal innovativeness: Interpreted in this study as consumers' likelihood to accept electric vehicles faster than their friends.

Therefore, this study hypothesizes that perceived usefulness, perceived ease of use, compatibility, and personal innovativeness have positive impacts on consumers' attitude toward behavior.

Hypothesis 4. Consumers' perceived usefulness of electric vehicles has a significantly positive impact on their attitude toward behavior.

Hypothesis 5. Consumers' perceived ease of use of electric vehicles has a significantly positive impact on their attitude toward behavior.

Hypothesis 6. Consumers' compatibility regarding electric vehicles has a significantly positive impact on their attitude toward behavior.

Hypothesis 7. Consumers' personal innovativeness regarding electric vehicles has a significantly positive impact on their attitude toward behavior.

3.2.3. Subjective Norm

Subjective norm refers to the positive or negative evaluation from external society or a reference group that an individual receives upon adopting a particular behavior [44]. Different researchers have different interpretations of subjective norm. Specifically, Tylor and Todd deconstructed it as peer influence and superior influence [42]; Burnkant and Page, Grube et al., and Engel et al. divided it into primary group and secondary group [45–47]. Fishbein and Lee et al. deconstructed it as normative behavior and motivation to comply [23,48,49]; Bhattacherjee deconstructed it as interpersonal influence and external influence [25]. Based on the research content, this study deconstructs subjective norm into two exogenous variables: Interpersonal influence and external influence:

1. Interpersonal influence: Interpreted as the impact of the groups with which consumers have frequent interactions, including parents, family, friends and supervisors, on their purchase of electric vehicles in this study.
2. External influence: Interpreted as the impact of mass media, expert opinions and other non-interpersonal information on consumers' purchase of electric vehicles in this study.

Therefore, this study hypothesizes that interpersonal influence and external influence have positive impacts on consumers' subjective norm.

Hypothesis 8. Interpersonal influence has a significantly positive impact on consumers' subjective norm.

Hypothesis 9. External influence has a significantly positive impact on consumers' subjective norm.

3.3. Definition and Measure of Variables

This study divides the theoretical framework of the factors influencing consumers' intention of purchasing electric vehicles into first-order dimensions (perceived usefulness, perceived ease of use, compatibility, personal innovativeness, interpersonal influence, external influence, attitude toward behavior, subjective norm, self-control ability, and behavioral intention) and three second-order dimensions (self-efficacy, facilitating conditions, and perceived behavioral control). The operational definitions of variables and the reference scales are shown in Table 2.

Table 2. Operational definitions of variables and reference scales.

Attribute	Research Variable	Operability Definition	Reference Scale
First-order	Perceived Usefulness	Consumers' perception of the efficiency of electric vehicle functions.	Davis, Bagozzi and Warshaw (1989); Taylor and Todd (1995) [32,42]
	Perceived ease of use	Consumers' ability to learn the operation of electric vehicles and use electric vehicles without too much efforts	Davis, Bagozzi and Warshaw (1989); Taylor and Todd (1995) [32,42]
	Compatibility	Consumers do not need to adapt themselves to electric vehicles	Taylor and Todd (1995) [42]
	Personal Innovativeness	Consumers' acceptance of electric vehicles	Bommer and Jalajas (1999) [50]
	Interpersonal Influence	The impact of the groups with which consumers have frequent interactions, including parents, family, friends and supervisors, on their purchase of electric vehicles	Bhattacherjee (2000) [25]
	External Influence	The impact of mass media, expert opinions and other non-interpersonal information on consumers' purchase of electric vehicles	Bhattacherjee (2000) [25]
	Attitude Toward Behavior	Consumers' attitude toward electric vehicle purchase	Fishbein and Ajzen (1977); Taylor and Todd (1995) [24,42]
	Subjective Norm	Subjective opinions of friends, family, mass media, government policies and Internet information on electric vehicles	Fishbein and Ajzen (1977); Taylor and Todd (1995) [24,42]
	Self-control Ability	Consumers' self-control ability	
	Behavioral intention toward electric vehicles	Consumers' intention of purchasing electric vehicles	Fishbein and Ajzen (1977); Taylor and Todd (1995) [24,42]
Second-order	Self-efficacy	Consumers' self-control ability for the purchase of electric vehicles, including ability, knowledge and confidence expression	Ajzen (2006); Taylor and Todd (1995) [26,42]
	Facilitating Conditions	Consumers' opportunities and resources required for the purchase of electric vehicles, namely the support of external resources	Ajzen (2006); Taylor and Todd (1995) [26,42]
	Perceived Behavioral Control	Consumers' control over the opportunities and resources required for the purchase of electric vehicles	Ajzen (1985); Taylor and Todd (1995) [21,42]

4. Research Results and Discussion

4.1. Analysis of Pre-Test Questionnaire

A Likert 7-point scale was adopted for the pre-test questionnaire, with response choices ranging from 1 (strongly disagree) to 7 (strongly agree). The pre-test was conducted between 3 and 10 April 2019. One hundred twenty questionnaires were distributed and 114 questionnaires were collected. To make the research results more accurate, a reliability analysis and a project analysis were conducted on the pre-test questionnaire to remove unstable questions and to establish the reliability and distinguishability of the questions.

In this study, Cronbach's α was used to measure the consistency between the questionnaire respondents and dimensions, in order to evaluate the reliability of the scale. As the SCA dimension is composed of PBC, SE and FC, the corresponding question was formed by three second-order dimensions. Then, the distinguishability of the questions was evaluated using project analysis. As shown in Table 3, the Cronbach's α of each dimension is greater than 0.7, which indicates that all the dimensions are highly reliable. However, after AT3 is removed, the Cronbach's α is 0.824, which is higher than the Cronbach's α of the associated dimension, 0.813. In addition, the correlation coefficient of the total score of AT3 is lower than the standard, 0.6, and the results of a t test on the independent

sample of remaining questions are significant. Therefore, AT3 was removed in subsequent distributions of formal questionnaires.

Table 3. Reliability analysis and project analysis of the pre-test questionnaire from different dimensions.

Dimension	Question	Cronbach's α	Correlation Coefficient with the Total Scale Score	P Value in t Test on Independent Sample
Perceived Usefulness (PU) Cronbach's α = 0.892	PU1	0.860	0.770	0.000
	PU2	0.857	0.784	0.000
	PU3	0.871	0.724	0.000
	PU4	0.880	0.681	0.000
	PU5	0.872	0.719	0.000
Perceived ease of use (PEU) Cronbach's α = 0.885	PEU1	0.853	0.757	0.000
	PEU2	0.871	0.679	0.000
	PEU3	0.860	0.725	0.000
	PEU4	0.857	0.740	0.000
	PEU5	0.863	0.714	0.000
Compatibility (C) Cronbach's α = 0.914	C1	0.893	0.802	0.000
	C2	0.893	0.803	0.000
	C3	0.906	0.715	0.000
	C4	0.902	0.738	0.000
	C5	0.898	0.766	0.000
	C6	0.901	0.746	0.000
Personal Innovativeness (PI) Cronbach's α = 0.837	PI1	0.819	0.614	0.000
	PI2	0.794	0.668	0.000
	PI3	0.790	0.686	0.000
	PI4	0.770	0.721	0.000
Interpersonal Influence (II) Cronbach's α = 0.794	II1	0.722	0.635	0.000
	II2	0.732	0.629	0.000
	II3	0.703	0.652	0.000
External Influence (EI) Cronbach's α = 0.825	EI1	0.768	0.672	0.000
	EI2	0.791	0.624	0.000
	EI3	0.814	0.569	0.000
	EI4	0.733	0.741	0.000
Self-efficacy (SE) Cronbach's α = 0.857	SE1	0.826	0.704	0.000
	SE2	0.832	0.694	0.000
	SE3	0.737	0.796	0.000
Facilitating Conditions (FC) Cronbach's α = 0.907	FC1	0.888	0.766	0.000
	FC2	0.890	0.749	0.000
	FC3	0.901	0.646	0.000
	FC4	0.895	0.700	0.000
	FC5	0.890	0.743	0.000
	FC6	0.894	0.714	0.000
	FC7	0.891	0.734	0.000
Attitude Toward Behavior (AT) Cronbach's α = 0.813	AT1	0.718	0.725	0.000
	AT2	0.773	0.617	0.000
	AT3	0.824	0.492	0.000
	AT4	0.729	0.703	0.000
Subjective Norm (SN) Cronbach's α = 0.845	SN1	0.785	0.722	0.000
	SN2	0.827	0.636	0.000
	SN3	0.812	0.673	0.000
	SN4	0.785	0.720	0.000
Perceived Behavioral Control (PBC) Cronbach's α = 0.829	PBC1	0.768	0.691	0.000
	PBC2	0.790	0.644	0.000
	PBC3	0.804	0.614	0.000
	PBC4	0.773	0.684	0.000
Behavioral Intention (BI) Cronbach's α = 0.864	BI1	0.791	0.764	0.000
	BI2	0.846	0.705	0.000
	BI3	0.793	0.767	0.000

4.2. Descriptive Analysis of Questionnaire

The questionnaires in this study were distributed online to individuals living in coastal areas as that is where the majority of electric vehicles in mainland China are. Through the questionnaire promotion system and personal social networking software, we investigated consumers' interest and understanding of electric vehicles. Formal questionnaires were then sent out to consumers interested in electric cars. The communication explained the purposes of the study and its significance. A total of 320 questionnaires were distributed from 13 to 28 April, and 300 valid questionnaires were collected, for a response rate of 93.75%. The socioeconomic data of those submitted valid questionnaires were analyzed (gender, marital status, age, monthly income, education level, and occupation). The results are reported in Table 4.

Table 4. Basic data of the sample.

Sample	Category	Number	Percentage
Gender	Male	140	46.67%
	Female	160	53.33%
Marital status	Single	42	14%
	Married	258	86%
Age	Under 20	18	6%
	21–30	76	25.33%
	31–40	116	38.67%
	41–50	55	18.31%
	Above 51	35	11.67%
Monthly income (RMB)	Under 4000	99	33%
	4001–8000	107	35.67%
	8001–12,000	33	11%
	12,001–16,000	32	10.67%
	16,001–20,000	11	3.67%
	Above 20,001	16	6%
Educational level	Middle school and below	52	17.33%
	High school or technical secondary school	126	42%
	Undergraduate or junior college	48	16%
	Graduate and above	74	24.67%
Occupation	Manufacturing	82	27.33%
	Medical care	99	33%
	Finance	37	12.33%
	Design	45	15%
	Services	19	6.33%
	Others	18	6%

Data source: Compiled by this study.

4.3. Measurement Model

4.3.1. Convergent Validity

This study followed the two-step approach of Structural Equation Modeling (SEM) proposed by Anderson and Gerbing [51] to estimate the measurement and structural model. The first step examined the construct reliability and validity of the measurement model using Confirmatory Factor Analysis (CFA), and the second step checked the path effects and their significance in the structural model. The measurement model was assessed using the maximum likelihood estimation (MLE) in terms of factor loadings, reliability of measurement, convergent validity, and discriminant validity.

Table 5 reports a summary of unstandardized factor loadings, standardized factor loadings, standard errors, significance tests, square multiple correlations, composite reliability, and average variance extracted (AVE). Three indexes for assessing the convergent validity of the measurement items proposed by Fornell and Larcker (1981) are: (a) The item reliability of each measure or square multiple correlation, (b) the composite reliability of each construct, and (c) the average variance extracted [52]. Composite reliability refers to the internal consistency in reliability of all indicators in a construct.

Table 5. Results for the measurement model.

Construct	Item	Significance of Estimated Parameters				Item Reliability		Construct Reliability	Convergence Validity
		Unstd.	S.E.	Unstd./S.E.	p-value	Std.	SMC	CR	AVE
PU	PU1	1.000				0.868	0.753	0.957	0.818
	PU2	1.062	0.050	21.308	0.000	0.872	0.760		
	PU3	1.188	0.051	23.322	0.000	0.914	0.835		
	PU4	1.311	0.051	25.746	0.000	0.957	0.916		
	PU5	1.086	0.048	22.797	0.000	0.908	0.824		
PEU	PEU1	1.000				0.889	0.790	0.959	0.824
	PEU2	0.969	0.041	23.508	0.000	0.892	0.796		
	PEU3	1.090	0.043	25.597	0.000	0.926	0.857		
	PEU4	1.133	0.043	26.520	0.000	0.942	0.887		
	PEU5	0.935	0.041	22.936	0.000	0.887	0.787		
C	C1	1.000				0.876	0.767	0.969	0.840
	C2	1.035	0.047	22.148	0.000	0.879	0.773		
	C3	1.131	0.045	25.162	0.000	0.930	0.865		
	C4	1.260	0.046	27.683	0.000	0.966	0.933		
	C5	1.031	0.045	22.907	0.000	0.894	0.799		
	C6	1.195	0.045	26.496	0.000	0.949	0.901		
PI	PI1	1.000				0.918	0.843	0.957	0.847
	PI2	0.998	0.035	28.220	0.000	0.926	0.857		
	PI3	1.036	0.039	26.628	0.000	0.915	0.837		
	PI4	1.034	0.038	27.466	0.000	0.923	0.852		
II	II1	1.000				0.914	0.835	0.941	0.842
	II2	0.987	0.036	27.411	0.000	0.942	0.887		
	II3	0.994	0.041	24.421	0.000	0.896	0.803		
EI	EI1	1.000				0.887	0.787	0.956	0.843
	EI2	1.088	0.044	24.550	0.000	0.912	0.832		
	EI3	1.246	0.049	25.409	0.000	0.930	0.865		
	EI4	1.229	0.046	26.525	0.000	0.943	0.889		
ATB	ATB1	1.000				0.902	0.814	0.940	0.840
	ATB2	1.167	0.042	27.903	0.000	0.959	0.920		
	ATB3	1.125	0.048	23.423	0.000	0.887	0.787		
SN	SN1	1.000				0.886	0.785	0.953	0.836
	SN2	1.051	0.041	25.451	0.000	0.927	0.859		
	SN3	1.056	0.044	23.888	0.000	0.912	0.832		
	SN4	1.091	0.043	25.322	0.000	0.932	0.869		
BI	BI1	1.000				0.899	0.808	0.934	0.826
	BI2	1.041	0.040	26.048	0.000	0.943	0.889		
	BI3	1.023	0.045	22.768	0.000	0.884	0.781		

Unstd.: Unstandardized factor loadings; Std: Standardized factor loadings; SMC: Square Multiple Correlations; CR: Composite Reliability; AVE: Average Variance Extracted.

As shown in Table 5, each standardized factor loading is between 0.868 and 0.966, falling into a reasonable range. This demonstrates that all questions have convergent validity. The composite reliabilities of the constructs range from 0.934 to 0.969, exceeding the value of 0.7 recommended by Nunnally and Bernstein [53], indicating that all constructs have internal consistency. Lastly, the average variance extracted (AVE) values range from 0.818 to 0.847, exceeding the 0.5 value suggested by Hair,

Anderson, Tatham, and Black and Fornell and Larcker, showing that all constructs have adequate convergent validity [52,54].

4.3.2. Second-Order Confirmatory Factor Analysis

It is common to present a second-order latent factor model in a research study. A second-order construct is defined as a situation where several first-order latent factors are affected by a higher-level common factor. The higher-order factor does not have any observed variables. The second-order factor directly connects to the first-order factors, and each first-order factor links to its observed variables. The second-order model, like the first-order model, must be evaluated by confirmatory factor analysis. In SEM, it is unusual to find a three-order or four-order construct in the proposed model.

Chin argued that there are two concerns when using a second-order construct in the proposed model. The first is whether the proposed model has a common factor that can explain the variation of all first-order factors. The second is whether the second-order factor directly links to the first-order factors and relates to the other factors in the conceptual model [55].

The confirmatory factor analysis of the second-order model is similar to that of the first-order model. The reliability and validity of the first-order factors should be confirmed before the evaluation of the second-order factor model. The factor loading between the second-order factor and first-order factors should be 0.7 or above. As shown in Table 6, the reliability and validity of all constructs in the present study meet the level recommended by Fornell and Larcker [52,55].

Table 6. Confirmatory factor analysis of the second-order model.

Construct	Item	Significance of Estimated Parameters				Item Reliability		Construct Reliability	Convergence Validity
		Unstd.	S.E.	Unstd./S.E.	p-value	Std.	SMC	CR	AVE
SE	SE1	1.000				0.907	0.823	0.930	0.817
	SE2	0.999	0.040	25.102	0.000	0.930	0.865		
	SE3	0.960	0.043	22.104	0.000	0.873	0.762		
FC	FC1	1.000				0.868	0.753	0.973	0.839
	FC2	1.037	0.047	22.262	0.000	0.889	0.790		
	FC3	1.107	0.047	23.555	0.000	0.913	0.834		
	FC4	1.213	0.046	26.490	0.000	0.960	0.922		
	FC5	1.080	0.047	23.015	0.000	0.904	0.817		
	FC6	1.182	0.046	25.652	0.000	0.947	0.897		
	FC7	1.240	0.051	24.500	0.000	0.929	0.863		
PBC	PBC1	1.000				0.905	0.819	0.954	0.840
	PBC2	0.957	0.038	25.412	0.000	0.906	0.821		
	PBC3	1.062	0.041	26.073	0.000	0.921	0.848		
	PBC4	1.036	0.038	27.035	0.000	0.933	0.870		
SCA	SE	1.000				0.634	0.402	0.725	0.469
	FC	1.086	0.119	9.107	0.000	0.736	0.542		
	PBC	1.129	0.126	8.940	0.000	0.703	0.494		

Unstd.: Unstandardized factor loadings; Std: Standardized factor loadings; SMC: Square Multiple Correlations; CR: Composite Reliability; AVE: Average Variance Extracted.

4.3.3. Discriminant Validity

For the discriminant validity, the square root of the average variance extracted (AVE) of a given construct is compared with the correlations between the construct and the other constructs [52]. If the square root of the AVE of a construct is greater than the off-diagonal elements in the corresponding rows and columns, this implies that the indicators are more closely related to this particular construct than to the others.

As shown in Table 7, the bold numbers in the diagonal direction represent the square roots of the AVEs. Since all of the numbers in the diagonal direction are greater than the off-diagonal numbers, discriminant validity appears to be satisfactory for all constructs.

Table 7. Discriminant validity for the measurement model.

	AVE	PU	PEU	C	PI	II	EI	ATB	SN	BI	SCA
PU	0.818	**0.904**									
PEU	0.824	0.441	**0.908**								
C	0.840	0.475	0.413	**0.917**							
PI	0.847	0.473	0.404	0.481	**0.92**						
II	0.842	0.382	0.374	0.434	0.367	**0.918**					
EI	0.843	0.488	0.527	0.533	0.556	0.424	**0.918**				
ATB	0.840	0.401	0.377	0.384	0.362	0.254	0.340	**0.917**			
SN	0.836	0.302	0.323	0.331	0.339	0.318	0.590	0.210	**0.914**		
BI	0.826	0.407	0.370	0.432	0.393	0.345	0.493	0.363	0.405	**0.909**	
SCA	0.469	0.660	0.580	0.711	0.630	0.564	0.766	0.420	0.472	0.593	**0.685**

Note: The items on the diagonal in bold represent the square roots of the AVEs; off-diagonal elements are the correlation estimates.

4.4. Structural Model Analysis

By using the maximum likelihood method, this study performed structural model testing to estimate the hypothesized relationships of the proposed model. Model fit indicators determine the degree to which the sample data fit the structural equation model. Kline [56] and Schumacker and Lomax [57] recommended a variety of criteria to determine the model fit of a structural model. Jackson, Gillaspy Jr, and Purc-Stephenson [58] reviewed and compared 194 confirmatory factor analysis (CFA) studies published in American Psychological Association journals from 1998 to 2006. They suggested that the most commonly used model fit reporting guidelines are χ^2, df, χ^2/df ratio, GFI, AGFI, RMSEA, SRMR, CFI, and TLI(NNFI).

Table 8 presents several model fit indicators as well as the recommended thresholds. Except for χ^2, all model fit indicators exceed the recommended levels [57]. Because χ^2 is very sensitive to a large sample, the ratio of χ^2 to its degree of freedom was computed, and the ideal ratio should be below three for a good model fit. Hu and Bentler [59] suggested that instead of evaluating each index independently, more strict combination rules should be applied to model fit indices to control type I errors.

Table 8. Model fit.

Model Fit	Criteria	Model fit of Research Model
MLχ^2	The smaller the better	1828.451
DF	The larger the better	1191.000
Normed Chi-sqr (χ^2/DF)	$1 < \chi^2/DF < 3$	1.535
RMSEA	<0.08	0.042
SRMR	<0.08	0.062
TLI (NNFI)	>0.9	0.963
CFI	>0.9	0.966
GFI	>0.9	0.908
AGFI	>0.9	0.902

The model fit indicators, as shown in Table 8, satisfy both the independent level of recommended fits and the combination rule. Thus, the proposed model has a good fit.

Path Analysis

Table 9 shows the results of path coefficients. PU (b = 0.208, p = 0.005), PEU (b = 0.179, p = 0.005), and C (b = 0.166, p = 0.014) significantly impact ATB. EI (b = 0.599, p < 0.001) significantly impacts SN. ATB (b = 0.145, p = 0.022), SN (b = 0.160, p = 0.022), and SCA (b = 0.730, p < 0.001) significantly impact BI.

The results support the research question regarding the validity of the research model. We find that 24.9% of ATB can be explained by PU, PEU, C, and PI constructs; 35.4% of SN can be explained by II and EI constructs; 38.7% of BI can be explained by ATB, SN, and SCA constructs.

Table 9. Regression coefficients.

DV	IV	Unstd	S.E.	Unstd./S.E.	p-value	Std.	R^2
ATB	PU	0.208	0.074	2.827	0.005	0.188	0.249
	PEU	0.179	0.063	2.834	0.005	0.178	
	C	0.166	0.067	2.469	0.014	0.162	
	PI	0.116	0.062	1.862	0.063	0.123	
SN	II	0.078	0.053	1.468	0.142	0.082	0.354
	EI	0.599	0.065	9.267	0.000	0.555	
BI	ATB	0.145	0.063	2.284	0.022	0.137	0.387
	SN	0.160	0.070	2.290	0.022	0.159	
	SCA	0.730	0.138	5.298	0.000	0.460	

4.5. Hypothesis Explanation

The purpose of this study is to establish a theoretical framework of the factors influencing consumers' intention to purchase electric vehicles, then to identify the key factors influencing behavioral intention through a structural equation model, to draw conclusions, and to provide reference design recommendations for subsequent new energy automakers

All of the hypotheses were significant except H7 and H8. Figure 6 shows the significant relationships between variables in the structural model.

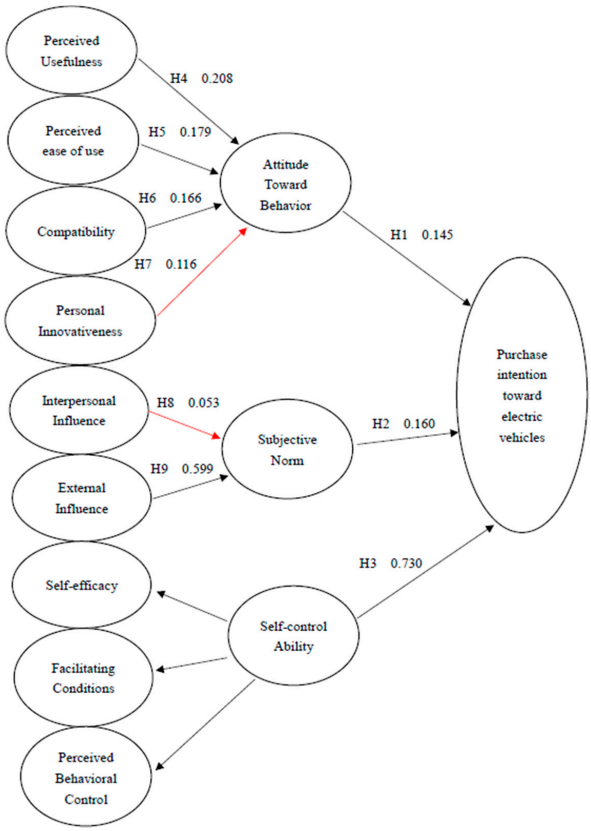

Figure 6. Research structure pattern diagram.

Following the verification of the structural equation model and test results, the verification results of the hypotheses in this study are summarized in Table 10.

Table 10. Verification results of hypotheses.

Hypothesis	Content	Result
Hypothesis 1 (H1)	Consumers' attitude toward electric vehicles has a significantly positive impact on their purchase intention.	Valid
Hypothesis 2 (H2)	Consumers' subjective norm regarding electric vehicles has a significantly positive impact on their purchase intention.	Valid
Hypothesis 3 (H3)	Consumers' self-control ability regarding electric vehicles has a significantly positive impact on their purchase intention.	Valid
Hypothesis 4 (H4)	Consumers' perceived usefulness of electric vehicles has a significantly positive impact on their attitude toward behavior.	Valid
Hypothesis 5 (H5)	Consumers' perceived ease of use of electric vehicles has a significantly positive impact on their attitude toward behavior.	Valid
Hypothesis 6 (H6)	Consumers' compatibility regarding electric vehicles has a significantly positive impact on their attitude toward behavior.	Valid
Hypothesis 7 (H7)	Consumers' personal innovativeness regarding electric vehicles has a significantly positive impact on their attitude toward behavior.	Invalid
Hypothesis 8 (H8)	Interpersonal influence has a significantly positive impact on consumers' subjective norm.	Invalid
Hypothesis 9 (H9)	External influence has a significantly positive impact on consumers' subjective norm.	Valid

From the analysis on the questionnaire survey in this study, the relationship of behavior intention of electric vehicles renting provides supports to 7 of the 9 hypotheses and has no significantly positive impact on 2 hypotheses. With this, H1 can be validated, suggesting that consumers' attitude on EV has a significantly positive impact on purchasing intention. H2 can also be validated, indicating that the subject norm of consumers on EV has a significantly positive impact on purchasing intention. H3 is valid as well, which means that the self-control ability of consumers on EV has a significantly positive impact on purchasing intention. H4 can be validated, indicating that the perceived usefulness by the consumers on EV has a significantly positive impact on their attitude toward behavior. H5 is valid, which implies that the perceived ease of use of EV held by the consumers has a significantly positive impact on their attitude toward behavior. H6 can also be validated, which means the compatibility of EV has a significantly positive impact on their attitude toward behavior. H7 is not valid, indicating that the personal innovativeness of EV has no positive impact on their attitude toward behavior. H8 is invalid, which suggests that the consumers' interpersonal influence does not positively influence their subject norm. On the contrary, H9 is valid, suggesting that external influence has a significantly positive impact on their subject norms. Figure 6 shows that, among all the key influential factors, the ability of self-control has the largest weight, indicating that consumers value the basic knowledge and preferential policies when purchasing EV. Manufacturers should take this factor into full consideration. External influence is another factor that the consumers value, revealing that consumers would take mass media reports and expert suggestions into consideration when purchasing EV. Manufacturers should take this factor into consideration as well.

5. Conclusions and Suggestions

The theoretical model used in this study is based on three theories—TPB, TAM, and IDT. The purpose of this study was to establish a theoretical framework of the factors influencing consumers' intention of purchasing electric vehicles, then to identify the key factors influencing behavioral intention through a structural equation model, to draw conclusions and to provide reference design recommendations for subsequent new energy automakers with relation to future consumers' choices and purchases.

5.1. Conclusions

Taking the dimensions of previous theories as the basis for our hypotheses, this study considered: (1) Perceived usefulness, perceived ease of use, compatibility and personal innovativeness as the sources of attitude toward behavior; (2) interpersonal influence and external influence as the sources of subjective norm; and (3) perceived behavioral control, self-efficacy, and facilitating conditions as similar dimensions. Consequently, we formed a new facet dimension which was named self-control ability. Finally, we considered attitude toward behavior, subjective norm, and self-control ability as the influencing sources of behavioral intention. Through the influence analysis conducted in this study, it was found that most of the dimensions have an impact on consumers' behavioral intention of purchasing electric vehicles. Regarding the applicability indicators, apart from χ^2, the others, namely, df, χ^2/df, GFI, AGFI, RMSEA, SRMR, CFI, and TLI (NNFI), all met the ideal standards. Therefore, the application of the key influencing factor model constructed in this study to explain consumers' behavioral intention of purchasing electric vehicles is acceptable.

According to the SEM analysis results, attitude toward behavior, subjective norm and self-control ability have significantly positive impacts on behavioral intentions. Specifically, self-control ability is the most influential, followed by subjective norm and attitude toward behavior, which indicates that consumers' control over the resources required to purchase electric vehicles has the highest impact on behavioral intention. In addition, the opinions heard by consumers from their surroundings also have a great impact on consumers' intention to purchase electric vehicles. In addition, consumer's environmental awareness and their acceptance of technology products are also factors that affect their behavioral intention.

According to the SEM analysis results, perceived usefulness, perceived ease of use, and compatibility have significantly positive impacts on attitude toward behavior. Specifically, perceived usefulness is the most influential, followed by perceived ease of use and compatibility, which indicates that when consumers believe that electric vehicles are more beneficial at the individual, environmental or national level, or they believe that it is easier and more convenient to use electric vehicles, they have a more positive attitude toward the purchase of electric vehicles. In addition, consumers think that electric vehicles are forward-looking technology products with similar driving operation and usage cost to traditional vehicles. These opinions and factors have positive relationships with consumers' attitudes to purchasing electric vehicles. In contrast, personal innovativeness has a negative impact, which shows that when consumers think they have no better understanding of electric vehicles than others around them, they will not prioritize electric vehicles. Besides, their interest in electric vehicles is also almost equal to that of traditional vehicles.

According to the SEM analysis results, interpersonal influence negatively affects the subjective norm of consumers, which implies that the opinions of family, friends, colleagues or supervisors will not affect their attitude or behavior regarding electric vehicle purchase. External influence positively affects the subjective norm of consumers, which implies that compared with the opinions of surrounding people, consumers are more convinced by objective information, expert opinions, and government policy support.

Seven among nine of the key factors are valid and may impact the consumers' EV purchasing intention at varying weights. Self-control ability and external influence have the highest weights, which suggests that consumers attach the greatest attention on these two factors. EVs have become a part of a

globally emerging industry, setting up a new development trend for the automobile industry. The important position that EVs hold makes it important for customers to gradually accept and embrace the new trend. However, consumers often hold conservative attitudes toward innovative products due to the lack of the relevant knowledge source, which means that they would not purchase such products until these uncertainties are removed. Manufacturers should take attractive measures to meet the needs of consumers so as to promote the popularization of EVs in the future.

5.2. Managerial Implications

1. It can be seen from the above conclusions that consumers believe that electric vehicles have a positive impact on environmental protection and consumers believe in objective information. At present, the promotion methods of electric vehicle manufacturers are mainly through network information, which is easily ignored. It is suggested that EV manufacturers advocate the theme of environmental protection and green life to increase consumers' cognition and preference for EV.
2. Consumers think that there is no obvious difference between the operation mode of EV and that of traditional vehicles. However, as a new type of green technology product, electric vehicles have an optimized driving operation compared with traditional vehicles, and are injected with innovative and technological functions such as voice systems, automatic parking systems, etc. Therefore, it is suggested that EV manufacturers increase consumers' opportunities to experience electric vehicles in person, so as to change consumers' cognition, expand the scope of influence of electric vehicles and enhance consumers' understanding of electric vehicles.
3. Consumers believe that the number of charging piles for electric vehicles will affect their purchase intention. Therefore, it is suggested that the government conduct a pilot layout of charging piles in major cities as a model, and then attract investment from relevant manufacturers through subsidies, in order to relieve the difficulty of charging electric vehicles.
4. Consumers believe that the price and life of batteries will affect their purchase intention. Therefore, it is suggested that electric vehicle manufacturers should adopt better battery service strategies such as battery leasing, while strengthening the development of battery technology. Manufacturers can introduce the concept of an automobile recycling economy, including automobile disassembly and power battery recycling, aimed at reducing the cost of batteries through the recycling, disassembly and reuse of waste and scrap automobiles and their components to promote the sustainable and healthy development of the automobile industry.

5.3. Future Research Directions

1. It is recommended that future researchers use different methodologies from this study to investigate electric vehicles and compare the differences in order to promote the popularization of electric vehicles.
2. The discussion in this study is limited to electric vehicles. It is recommended that future researchers compare whether different energy vehicles with different principles are related to different influences on consumer demand.
3. Oriented toward consumer demand, this study does not focus on electric vehicle-related technologies. It is recommended that future researchers connect industry and consumers from the industrial and technological perspectives of electric vehicles.
4. Due to time and resource limitations, this study only collected questionnaires from coastal areas in Mainland China. However, because of differences among different regions in Mainland China, people in other regions may hold different opinions about the topic of this study. Future researchers can also explore the situation in different regions to provide references for government and manufacturers to promote electric vehicles.

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