

# Research on Electric Vehicle Purchase and Sale Information Management System

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## ABSTRACT

With the increasing number of traditional fuel vehicle markets, the problems of energy supply and demand and environmental pollution are becoming more and more prominent. Electric vehicles with energy-saving and environmental protection characteristics are not only the breakthrough to solve this series of problems but also the key to the structural transformation of the automobile industry. This study takes the influencing factors of consumers' purchase of electric vehicles as the research objective, takes quantitative research methods as the main method, and qualitative research methods as the auxiliary method to explore the influencing factors of electric vehicle purchase intention. At the same time, it takes into account the theory of consumers' purchase decisions, builds an information management system, takes consumers' purchase intention as the explained variable, and defines independent variables from four dimensions of consumers' perceived value. It involves performance value, economic value, convenience value, and social value. Then, the research hypothesis is proposed that the four dimensions have a positive impact on consumers' purchase intention. Then, the author puts forward his opinion on how to obtain the maximum benefit for electric enterprises through information management. This paper finds that the higher the consistency, coherence, and credibility of the policy mix, the higher the consumers' willingness to adopt electric vehicles, and positively regulates the relationship between perceived behavioral control and consumers' willingness to adopt electric vehicles. This paper also expounds on the influencing factors of purchase, which will play a positive role in promoting the consumption and development of electric vehicles.

**Keywords:** Electric Vehicles (EV), Consumption Intentions, SOR Model, Information Management.

## INTRODUCTION

The challenges of fast urbanization have led to new city communities that purpose to create sustainable and livable environments that prioritize residents' well-being (Sun, Z. Li, Wang, & C. Li, 2019). China is a massive energy-consuming due to its giant populace base; as shown in **Figure 1**, China imports more than 540 million heaps of crude oil in 2020, making it the world's biggest importer of crude oil. And greater than 70% of crude oil is used in transportation. The dollar oil system, in turn, leads to the security of our foreign exchange reserves. To get out of excessive dependence on oil as soon as possible, the prospect of developing electric vehicles to replace fuel vehicles has become imminent. In this respect, our government has made many efforts to introduce policies to support the growth of new energy vehicles, to replace conventional fuel vehicles, and to reduce the consumption of crude oil. Besides this respect, Santos, Pinto,

Rossetti, and Oliveira (2016) stated electric vehicles are often equipped with energy recuperation mechanisms.

China's electric vehicle market is developing well; according to **Figure 2**, the domestic electric vehicle industry has achieved great results in various types of promotional policy support; China's new energy vehicle development has gradually entered the fast lane, and the scale of production and sales has been rising year after year: at the level of the product structure, the pure electric vehicle accounted for more than 60% of the new energy vehicle sales: the technical level has made a big breakthrough, the chip integrated design, electronic System integration technology has made new progress, Hexafluorophosphoric acid, wet diaphragm and other high technical barriers to battery materials have been localized; export scale in recent years has been accelerating the trend. However, problems include uneven

market development, insufficient supporting infrastructure, and low industrial concentration.

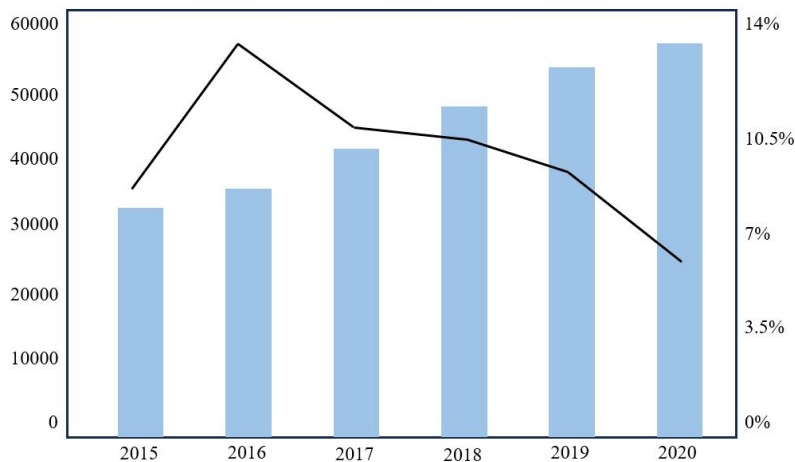


Figure 1. China's Crude Oil Imports and Growth Rate (Data source: <http://www.stats.gov.cn/>)

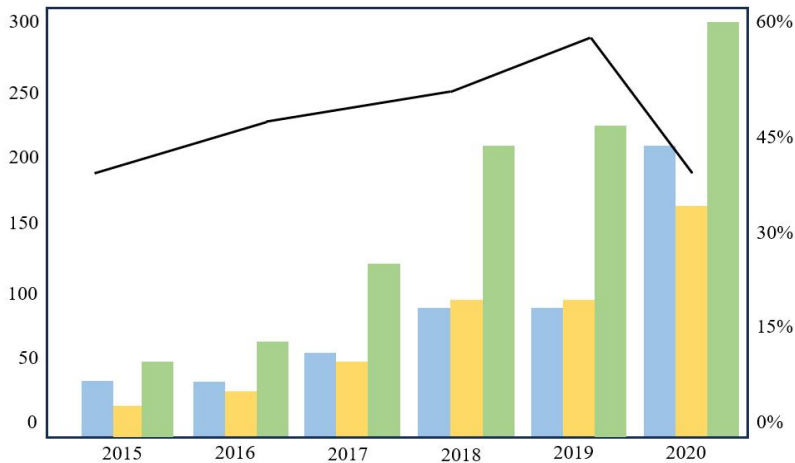


Figure 2. Global New Energy Vehicle Sales and Proportion (Data source: <http://www.stats.gov.cn/>)

In the past, the Chinese Government and enterprises focused mainly on the industrial policy and technological innovation of electric vehicles. They did not conduct enough research on marketing at the consumer level. To summarize, to achieve “overtaking” in the field of electric vehicles, it is necessary to understand the factors that affect consumers’ purchasing of electric vehicles and implement interventions to promote the rapid development of the electric vehicle market on the factors that have the greatest influence.

## LITERATURE REVIEW

### SOR Model Theory

The SOR (Stimulus-Organism-Response) model was first established based on environmental psychology, and based on the S-O (Stimulus-Organism) model, the Organism part was added, which mainly explains the intrinsic psychological mechanism of human beings, and it is one of the classic theories of environmental psychology, which was firstly put forward by Mehrabian and Russell (1974), and shown in Figure 3. Based on the original model, Donovan,

Rossiter, Marcolyn, and Nesdale (1994) first included shopping scenarios in the model to study consumers’ purchasing behaviors and proposed that the environment of the store would cause the expression of individual consumers’ psychological emotions, such as pleasure arousal control. At the same time, this psychological emotion would further affect the individual to produce acceptance or avoidance behaviors. A complete SOR model must contain three basic parts, i.e., Stimulus, Organism, and Response. Stimulus refers to the various elements that affect the individual, which can cause the individual’s internal psychological response, and includes various external environmental elements. Organism mainly refers to the individual’s internal psychological state, perception emotion, etc., which is a person’s psychological cognition and psychological state; in the SOR model, the stimulus variable and the response variable usually occupy the position of the mediator variable (Nolan, 1973). Response refers to the internal or external behavioral reaction individuals exhibit after being influenced by a stimulus. Intrinsic responses are mostly presented in the form of personal attitudes, while extrinsic responses are reflected in the individual’s behavior.

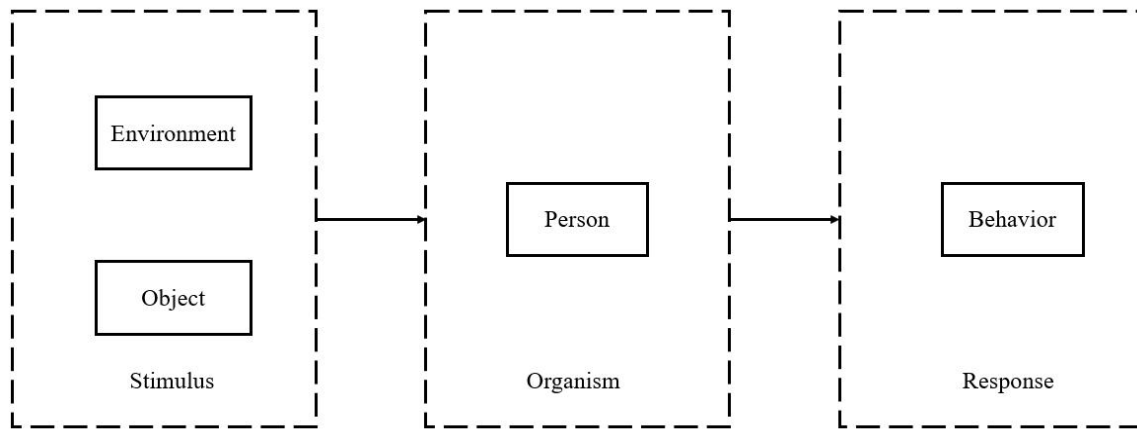


Figure 3. Theoretical Framework of SOR

Stimulus factors in the SOR model include a series of external environmental factors. Still, in consumer purchase decision-making behavior, product characteristics are very typical stimulus variables, including product quality and price. Appearance and other factors, these product stimuli will make the consumer's personal psychological activities change, including cognitive, emotional, and other aspects, such as perceived value, consumer emotions, etc., and finally, in the role of the body's response to make a different purchase behavior, or show a different attitude to purchase, this process can be very effective in explaining the consumer's purchasing decision-making behavior.

### Theory of Planned Behavior (TPB)

The Theory of Planned Behavior (TPB), proposed by American scholars Fishbein and Ajzen in 1975, is often used to measure the subjective possibility of an individual doing a certain behavior. The Theory of planned behavior evolved from the Theory of Reasoned Action (TRA). Since individual behavior choices are complex and not completely affected by attitudes and subjective norms, TRA has shortcomings in its explanatory power to individual behavior intentions and needs to be improved. In 1985, scholar Aizen added Perceived behavior control (PBC) to the basis of TRA. In 1991, the Theory of Planned Behavior was officially published, marking the formal introduction of TPB. According to this theory, the possibility of a person doing a certain behavior can be estimated by his behavioral intention. For different behaviors, each dimension has a different influence on the behavioral intention, corresponding to different execution possibilities.

### Sales Information Management

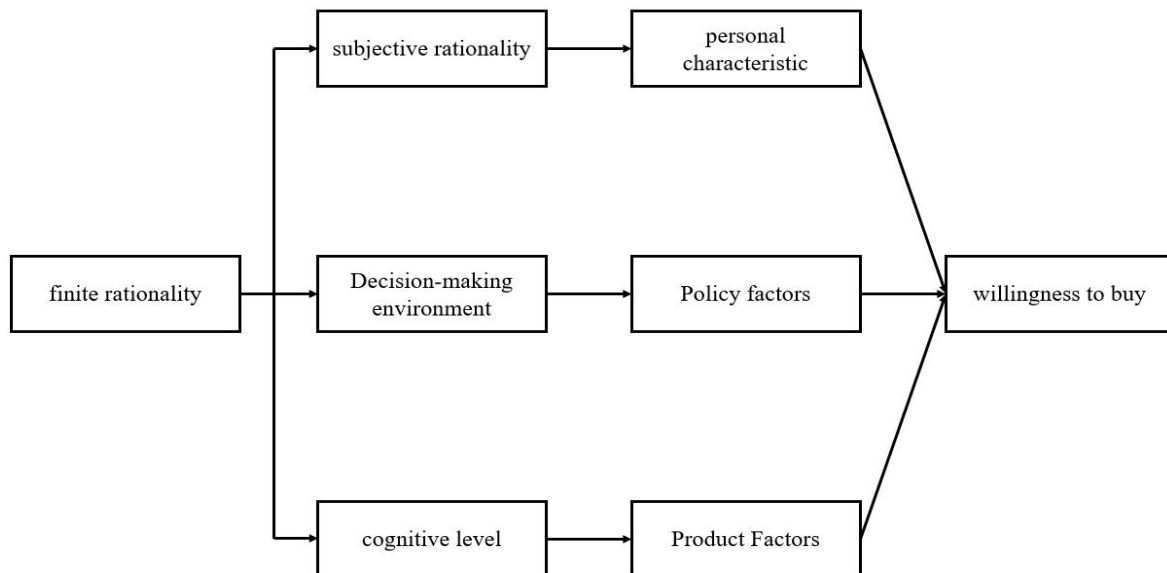
In 1954, General Motors Corporation used computers for the first time to calculate employee salaries, ushering in a new era of computer use in business management. Richard L. Nolan, a professor at Harvard Business School, proposed a four-stage Growth model (Stages of Growth Model) in 1973, and adjusted it to a six-stage model in 1979, which is now the Nolan model. In the 1990s, Mische, an American scholar, proposed improvements to the Nolan model and formed the Mische model. Forest Woody Horton Jr., an American

information management expert, conducted an in-depth study of information management and believed that the essence of management is an activity with specific value to achieve certain interests, and it is effective management and control of information through valuable resources. In the mid-1960s, the emergence of "MRP" solved the problem of inventory control; In the mid-1970s, the emergence of closed-loop RP solved the problem of planning and control; in the early 1980s, the emergence of MRPII solved the problem of the integration of material information and financial information; in 1990, Gartner Group in the United States proposed ERP (Enterprise Resource Planning). It is an integrated software solution designed to help organizations coordinate and manage a variety of critical business processes and functions internally, such as finance, supply chain, production, human resources, and more. The core of ERP is to improve the utilization of resources through the integration of information, optimize processes, support decision-making, and allow users to customize ERP systems according to their business needs, which solved the problem of the global economic environment. Improving the competitiveness of enterprises; In 2000, Gartner Group extended ERPII based on ERP. In the 21st century, the emergence of cloud services has brought more opportunities for ERP application innovation. Johansson and Ruivo (2013) conducted an in-depth study on the pattern formation of the cloud ERP service model and its influencing factors. Caione, Guido, Martella, Paiano, and Pandurino (2016) and others mainly take automobile enterprises as an example to provide a reference for their construction of information mode and believe that such enterprises must pay attention to the application of phased and structured methods, and do a good job in design and planning. Sanguesa, Torres-Sanz, Garrido, Martinez, and Marquez-Barja (2021) analyzed the construction of an information evaluation system mainly from the perspective of information evaluation. He believed that information evaluation has a direct judgment on information management efficiency, and evaluation efficiency affects the improvement of enterprise information management. He proposed that the use of advanced management concepts and new technologies to enhance the vitality of enterprises, the process of realizing sustainable development of enterprises belongs to the process of enterprise information management construction.

## ELECTRIC VEHICLE PURCHASING INFLUENCING FACTORS

The consumer's purchasing decision process can be divided into five stages: demand identification, information collection, program evaluation, purchasing decision, and post-purchase evaluation. At different stages, consumers can only find a satisfactory solution from a limited number of alternatives because of their limited knowledge, information, computational ability, etc. Consumers, as a subjective and

limited rational group, are affected by the external environment when making decisions. Consumers, as a subjective, limited rational group, will be affected by the external environment when making decisions, and with the change in the environment, consumers' willingness to program may change. Based on the finite rationality hypothesis, the initial framework of the influence of factors on consumers' willingness to purchase electric vehicles is shown in **Figure 4**.



**Figure 4.** Initial Analytical Framework of Factors Influencing Willingness

In the stage of demand confirmation, individuals have the intention to buy only after being recommended by others, influenced by people around them, or attracted by publicity policies, and the creation of the intention to buy is often the result of the combined stimulation of internal and external factors (Sherman, Mathur, & Smith, 1997). After having the intention to buy, due to the lack of knowledge reserves and insufficient experience, individuals will start to collect information, and to maximize their benefits, they will check the information on the Internet, learn about the physical store, and test-drive the electric car. To maximize their benefits, individuals learn about the performance, price, after-sales service, range, charging speed, and other information about electric vehicles through online information, physical stores, and test drives. The cost of the information collection stage is also calculated in the final

purchase cost, so the time and money cost of purchasing an electric vehicle is higher than that of a traditional fuel vehicle. After the information collection, the individual chooses his or her preferred product through repeated comparisons combining price, performance, and other factors (Li, Khajepour, & Song, 2019). At this point, the willingness to purchase electric vehicles has been formed, but the willingness does not necessarily lead to the purchase behavior, such as spontaneous combustion of electric vehicles, policy changes, and other unforeseen events may also lead to changes in the willingness to purchase. After the purchase is completed, a bad product experience will lead to negative evaluations, impacting the purchase decisions of other potential consumers. Considering the purchase of electric vehicles as a continuous decision-making and complete system, a broad consumer purchase decision-making process is shown in **Figure 5**.

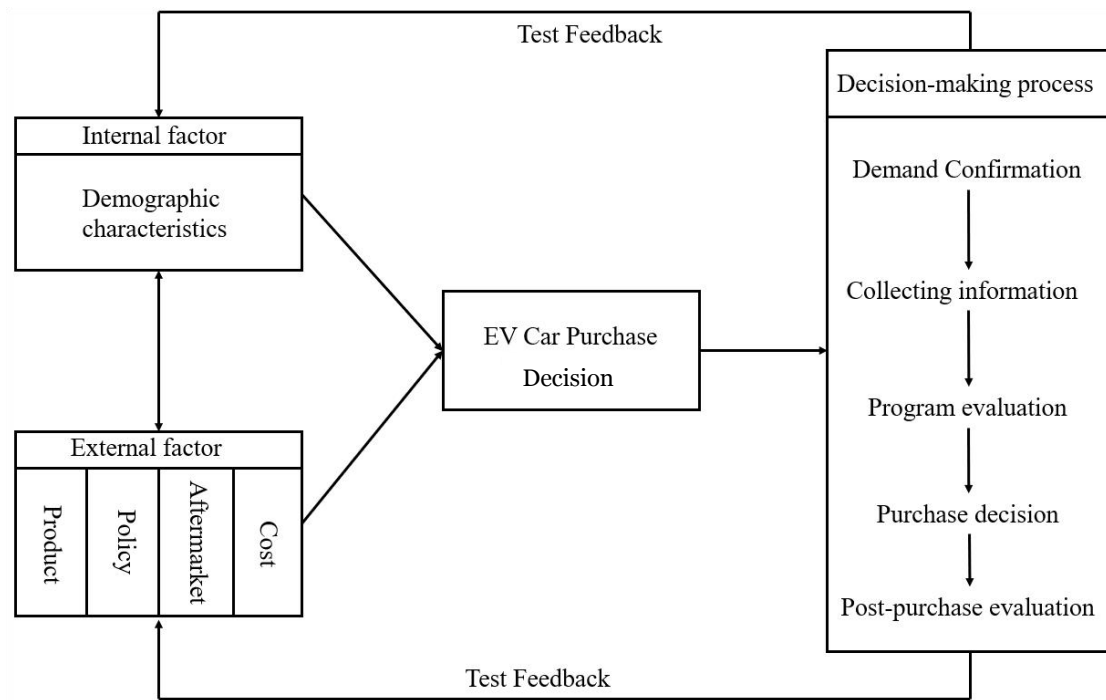


Figure 5. Consumers' Generalized Decision-making Process

### Consumers' Factors

#### Value Level

Energy harvest from the suspension has been studied for many years, and there are two common types of energy recovery shock absorbers: linear design and rotary design (Chang & Chen, 2008). J. H. Park, Kang, K. H. Park, and H. D. Park (2018), in exploring the acceptance of hydrogen fuel cell vehicles and related influencing factors among South Korean residents, noted that personal values (concern for the environment and belief that personal efforts will lead to good results) have a positive impact on consumer purchase intentions. Blau and Kahn (2007) and Gallagher (2011) echoed this viewpoint, arguing that values influence individuals' behavioral decisions.

#### Attitudinal Awareness Level

Aboelela et al. (2017) used different methods to study Canadian consumers' attitudes towards the purchase of electric vehicles. The results showed that under the price sensitivity method, consumers' acceptable price range for electric vehicles was comparable to that of conventional vehicles; while under the willingness to pay method, consumers' purchase intention to buy electric vehicles remained low despite the message conveyed to them about future fuel savings. The study also points out that the promotion of the use of electric vehicles has been overly focused on technology, and there is still room for further improvement in terms of consumer focus.

#### Subjective Normative Level

Caulfield and Dolev (2010) found that consumers are more likely to be influenced by friends and relatives than professionals when studying the factors that influence the purchase of hybrid vehicles in Ireland. At the same time, consumers may also choose environmentally friendly cars to comply with social norms. Oman (2002) studied the

influence of psychosocial factors (attitude, perceived behavioral control, subjective norms, low-carbon awareness, etc.) on consumers' purchase intention based on structural equation modeling and pointed out that subjective norms have a stronger influence compared to other factors.

#### Consumer Perceived Effectiveness Level

Heffner, Kurani, and Turrentine (2007) conducted semi-structured interviews with 57 families in the U.S. and showed that consumers who buy electric vehicles place more importance on the economic benefits of the fuel and that consumers who have a higher level of awareness of resources and environmental protection have stronger perceived effectiveness of the environmental performance of electric vehicles, which can have a positive impact on purchasing behavior.

### Product Factors

Ewing and Green(2000) used a discrete choice model to study the preferences of 1500 consumers in Canada for fuel and clean energy vehicles. The study showed that although consumers realized the environmental value that clean energy vehicles have, the convenience of charging, range, safety, and driving dynamics are still the key concerns of consumers when purchasing a vehicle. Hidrue, Parsons, Kempton, and Gardner (2011) studied the willingness to pay for an electric vehicle based on a discrete choice model using a web-based survey with 3,029 residents in the United States. The results show that concerns about range, long charging time, and high purchase price are still the main issues that consumers are worried about. Cecere, Corrocher, and Guerzoni (2018) studied the influencing factors of consumers' willingness to purchase electric vehicles through a survey of 3,594 samples from six different European countries and found that price is the most important factor influencing

consumers' willingness to purchase electric vehicles by using the discrete choice model. Factor, for those with a low initial willingness to buy, improved driving range is the second most important factor, while for consumers with a high initial willingness to buy, the possibility of charging at home is the second most important factor influencing their willingness to buy.

### Policy Factors

Chandra et al. (2010) studied the impact of tax incentives on hybrid electric vehicle sales in Canada. The results of the study show that tax breaks can significantly stimulate consumers' willingness to buy, and a tax break of US\$1,000 can increase the sales of hybrid electric vehicles by 31%-38%. Lin Zhang, Lei Zhang, Mou, and D. Zhang (2011) conducted a questionnaire survey on 299 respondents from driving schools in Nanjing, China, and used binary Logistic regression analysis to find that government policies and fuel prices have a significant impact on consumers' willingness to buy. He, Yu, and Lou (2017), through a questionnaire survey of consumers in Beijing, Tianjin, and Hebei, pointed out that consumers' awareness of electric vehicles and related policies is generally low, consumers' preference for policies varies in different regions, and policies promote behavioral intentions mainly by mitigating consumers' perceived risks.

### Non-functional Values

In using electric vehicles, consumers not only obtain the

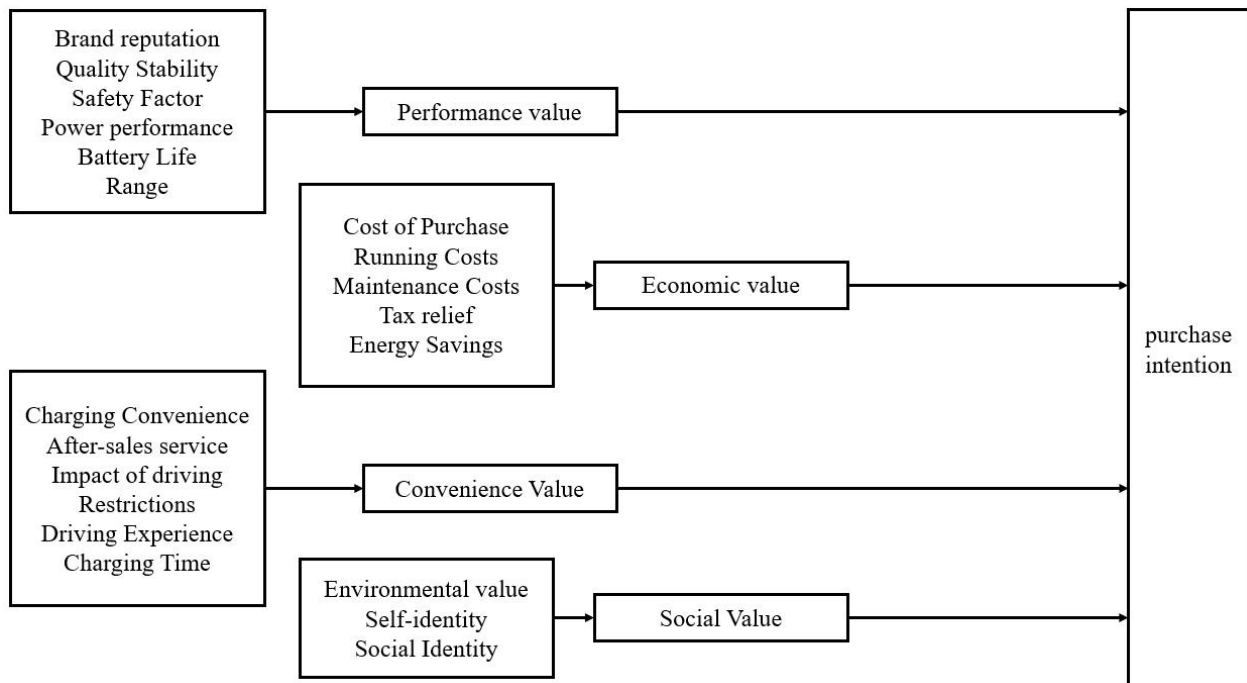
functional value of the product and experience the convenience value of the product after use but also obtain the corresponding non-functional values, such as economic and social values (Turley & Milliman, 2000). In this paper, these values are categorized and defined as follows.

1. Performance value: Consumers perceive factors related to vehicle quality when using EVs, such as vehicle quality, safety, battery life, range, charging time, power performance, noise issues, etc., that need to meet customers' needs in terms of practical functionality.

2. Economic value: Consumers purchase electric vehicles to pay the purchase price, in the use of the process to generate the use of costs, compared with fuel vehicles can reflect the total cost savings. Whether there is a better cost-effective is the core of the economic value.

3. Convenience value: The convenience value of electric vehicles is mainly reflected in the convenience of after-sales service, more right of way in cities with purchase and traffic restrictions, etc. Consumers can feel the daily convenience of using electric vehicles.

4. Social value: Consumers who buy and use electric vehicles not only get the value of use but also get the non-functional value of social recognition and self-recognition, such as the satisfaction of using environmentally friendly products (Walsh, Shiu, Hassan, Michaelidou, & Beatty, 2011). The above is a summary of the classification criteria for the customer perceived value of electric vehicles, as shown in **Figure 6**, to prepare for further research hypotheses and variable analysis.



**Figure 6.** Main Factors Influencing Consumers' Willingness

### Value Hypothesis

Aizen and Fishbein's (1980) study pointed out that attention to a product does not directly affect a specific purchase behavior but indirectly affects the purchase

behavior by affecting some other variables. Bamberg's (2003) study has shown that attention to a product mainly affects an individual's behavioral intention through norms, beliefs, and attitudes, which suggests that attention to products may be

an indirect factor influencing behavioral intention and the relationship between the factors shown in **Figure 7**. Therefore, this paper proposes the following hypothesis.

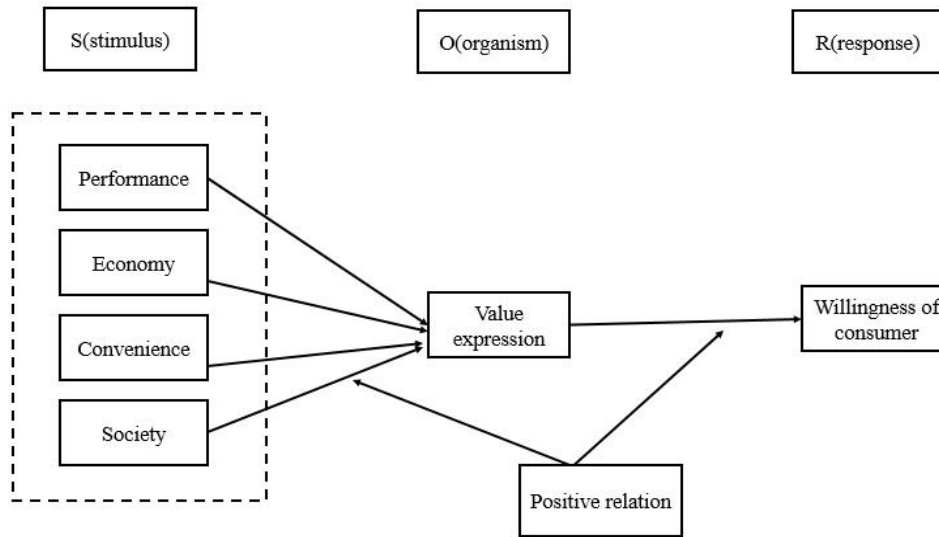
H1: Performance value has a positive effect on consumers' willingness to purchase electric vehicles, such as consumers' purchasing behaviors whether it's positive or negative.

H2: Economic value has a positive effect on consumers' willingness to purchase electric vehicles, which is related to

the profit of companies and consumers.

H3: Convenience value has a positive effect on consumers' willingness to purchase electric vehicles. The convenience that vehicles brought to the consumers.

H4: Social value has a positive effect on consumers' willingness to purchase electric vehicles. The low CO2 release to the environment means better air quality and living quality.



**Figure 7.** Relationship Between Factors Affecting Consumption

## ENTERPRISE SALES MANAGEMENT INFORMATION SCHEME

Through the above analysis of the consumption model and the factors that affect consumer purchase, it is found that consumers are only one end of the purchase process, and the other end lies in the sales management of enterprises, among which the most important problem is the fit between the information-based business process and the actual business process (Kollat, Engel, & Blackwell, 1970). If the business process management itself has certain problems that cannot be solved by informalization, Therefore, there is nothing to be done using information technology, which makes the enterprise urgently need an effective system method to solve the problems in the actual sales management business, and then through effective information technology and effective

control and incentive of people, finally achieve the ultimate goal of sales management information technology: improve management, improve efficiency and improve efficiency.

### Customer Source Informalization

To find people is to find their attributes and characteristics, and manage, share, and use them through information means. Key persons and key opinion leaders are all relevant personnel of the customer, and they can be put into the customer contacts for unified management, and then distinguish their differences through attributes (Fang, Guo, Xu, & Zhang, 2013). The focus of this part of informalization is to record some important attributes of the customer contacts, to discriminate different personnel, as shown in **Table 1**. In actual construction, attributes should be added according to business needs.

**Table 1.** Customer Contact Management Information Scheme Planning

Attributes	Attribute Type	Value Range	Note
Name	Text	Boy/girl	
Sex	Checkbox		
Contact number	Text		
Mailbox	Drop-down box		
Category	Multiple selection	Key contacts/opinion leaders/general contacts/others	

### Winning Process Management Information

Winning process management refers to the management

and control of sales personnel and customers/contacts in the winning process, and the core is the management and control of sales personnel (people). The management control

of sales personnel can be divided into two categories: formal control and informal control (C. Park & Lee, 2009). Formal control is a kind of explicit control mechanism generated by the management, which mainly includes behavior control and result control. Informal control is a non-explicit, employee-generated control mechanism, which mainly includes social control, cultural control, and self-control. The informalization of win-order process management is mainly

related to formal control. Oliver and Anderson regard formal control as an aggregate multidimensional construct and divide formal control into six dimensions: supervision, result, attitude, effort (behavior), information feedback (report), and the proportion of fixed salary in the total salary of sales personnel. The characteristics of behavior control and result in control systems in formal control are shown in **Table 2**.

**Table 2.** Characteristics of Sales Control System Based on Behavior and Result

Behavior Control	Result Control
Structural	Almost unstructured
Fixed salary management monitors behavior rather than outcomes	Variable wage
More supervision and management	Manage monitoring outcomes rather than behaviors
More related to management	There is little oversight and little management
More reports	Rarely associated with management almost no reporting
Performance reviews are subjective on several criteria	Performance evaluation on some observable results
Enterprise bearing risk	Salespeople take risks

At present, the management and control of sales personnel by enterprises need to adopt a combination of behavior and result control mode, such as both fixed salary and variable commission, control behavior and control result, performance evaluation has both subjective and objective factors, and enterprises and sales personnel share risks. Control itself is not the end, the ultimate goal of winning process management control is to improve the winning rate, the purpose of winning process management information is

to help improve the efficiency and quality of winning process management.

#### Informalization of Indicator Management

Indicators refer to the dynamic information of key people about their association status, attitude, and trust in salespeople or enterprises, and can be managed in the information of key people/contacts, as shown in **Table 3**.

**Table 3.** Winning Status Indicator Management Information Scheme Planning

Attributes	Attribute Type	Value Range	Note
Name	Text		
Correlation state	Select an option from the drop-down list		Nothing to say/nothing but official talk/effective talk/nothing to talk about
Buying point	Text		
Attitude indicator	Select an option from the drop-down list		Mostly disagree/mostly agree/strongly agree
Trust indicator	Select an option from the drop-down list		One-to-one occasions do not agree/one-to-one or small occasions basic agreement/large or important occasions basic agreement
Remark	Text		

#### Financial System Information Optimization Setting

Adopt efficient, comprehensive, and integrated information management system, integrate business data information and financial data information, form the coordination of vouchers and bills, automatic summary of detailed accounts into the general ledger, fully adopt electronic ledger, abandon manual account, and all kinds of data based on a data background, form a unified, real-time and efficient situation (Blau & Kahn, 2007). For example, when a part is received from a production shop, it must be indicated which production order the part is used for, and for parts that cannot be explicitly assigned to a production order, it must be specified from which workshop. Similarly, if the workshop returns excess parts to the warehouse, it must and should also indicate which order was returned from production. In this way, at the end of the month

statistics, for the parts that can be specified to the specific production order, the system will automatically summarize, thus forming the direct material cost of the order, and for shared materials, according to the actual situation of the workshop, the use of a suitable allocation rate, the shared materials will be distributed between different orders. So, you can accurately and quickly calculate the material cost of the order (Alanazi & Alenazi, 2023). Similarly, labor costs, manufacturing costs, etc., can also be solved. In this way, the manufacturing cost of the order can be accurately calculated. The system should have more comprehensive functions, such as decision-making, analysis, report generation, accounting, and other functions. Therefore, different applications in the system must be fully integrated and can be effectively integrated with other subsystems in the company. Assuming that changes in related economic matters occur in the actual operation of the neutron system,



the system should be able to obtain the changing data and timely change the relevant data information, as shown in

**Table 4.**

**Table 4.** Difficulties and Ideas of the Financial Management System

Item	Management Difficulty	Solution Idea
Financial department	1. How to respond financially to the operation of the business 2. How to accurately account for production costs 3. How to provide effective financial data for business decisions	1. Implementation of financial business integration system 2. Implementation of manufacturing and cost management system 3. Implement a business decision analysis system

### Competition

Generally speaking, when it comes to competition, people will think of competitors and their products, to adopt competitive strategies and tactics. Competition is essentially a set of factors that hinder key people from identifying, accepting, and using "integrated products" (Beggs, Cardell, & Hausman, 1981). The focus is on key people, that is, first of all, we need to pay attention to and find these obstacles, and

then find their spokespersons, where it is easy to obtain the "competitive position" of these spokespersons and obtain the trust of these spokespersons through effective sales activities, to win the competition.

The management of relevant competition is still based on the key person, that is, the contact person, and the relevant information content of competition management is also carried out in contact information management, as shown in

**Table 5.**

**Table 5.** Competition Management Information Scheme Planning

Attribute Name	Attribute Type	Value Range	Remark
Name	Text		
Competitive factor	Text		
Competitive strategy	Text		
Competitive tactics	Text		
Remark	Text		

## CONCLUSION

While existing studies have investigated the role of different types of factors in driving consumer adoption of electric vehicles, their findings are mixed, leaving policymakers confused about how different types of policy tools work and how effective they are. Therefore, from the perspective of policy mix, this chapter combines the psychological factors of consumers with the characteristics of policy mix and puts forward a set of management plans for the purchase and sale of electric vehicles from enterprises to consumers, which will not only help to provide new insights for the current policy research and the adoption literature of electric vehicles. And it also has important practical significance for the rapid popularization of electric vehicles. The theoretical model needs to be further perfected. This study is based on previous research results, combined with personal research practice, and selected research variables. However, the consumer purchase decision is a complex process, which will be affected by many factors in real life. In the follow-up study, the author will further improve the theoretical model proposed in this study, add new dimensions to each variable to refine the research content and conclude a more comprehensive model of "influencing factors of audience's purchase intention" to further improve the persuasive power of the study.

## CONFLICT OF INTEREST

No potential conflict of interest was reported by the

authors.

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