

A STUDY OF THE FACTORS INFLUENCING THE CONSUMER OF EVS IN CHINA*

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Abstract

In recent years, China has made every effort to promote the development and promotion of electric vehicles, and the momentum is the same worldwide. In such a context, how to grasp the consumer behavior of China's electric vehicle market is of great guidance for the production and marketing of Chinese electric vehicle enterprises. This study summarizes the relevant literature from previous years based on Consumer behavior theory, Howard Shears model, and Engel's model, and identifies four dimensions of consumer influence on Chinese electric vehicles: attributes, policies, individual consumers, and external factors. Then, the research data from 10 years ago and today are analyzed and compared longitudinally based on these four dimensions, and the changes and current situation of factors influencing Chinese electric vehicle consumers' consumption over the past 10 years are derived. Finally, recommendations are made to promote the development of EVs in the Chinese market.

Keywords: Consumer behavior, Influencing factors, electric vehicles (EV).

Introduction

Research Background

In terms of energy problems, the share of fossil energy consumption in total energy consumption has steadily increased year by year since 1973, with an average annual growth rate of 1.2%, until it accounted for 28.2% of total energy consumption in 2018 (International Energy Agency, 2018). According to the China National Petroleum Corporation Institute of Economics and Technology (CNPC, 2019), China's oil dependence reached more than 70% in 2019. These figures indicate that China's energy crisis is relatively urgent. However, under the influence of the development and use of new energy sources, but also simultaneously with the impact of the epidemic on the global economy, the share of primary energy consumption has declined significantly, with an annual change of -4.5% in 2020 and an annual change of -6.3% in carbon emissions (bp World Energy Statistics Yearbook, 2021). Among these, the rapid development of EVs in recent years is one of the reasons that have made the energy and environmental problems less severe.

When it comes to a low-carbon economy, the automobile industry is a part of it that cannot be ignored. "Electrification, intelligence, and sharing" have become the strategic direction of the global automotive industry, and EVs are the most important part of the

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future changes in the automotive industry. In China, since 2012, the State Council has introduced several policies to support the development of the EV industry, making the sales and ownership of EVs in China rank among the top in the world, and the technology level has been continuously improved and has certain advantages in the international arena.

According to data compiled by the National Bureau of Statistics of China (NBSC, 2022), the focus of China's future automotive development will shift to EVs that are green and less costly to use. In 2021, China's EV sales completed 3.521 million units, up 1.6 times year-on-year, ranking first in the world for seven consecutive years. Among them, the production and sales of pure EVs were 2.442 million and 2.916 million, an increase of 1.7 times and 1.6 times respectively; the production and sales of plug-in hybrid vehicles were 601,000 and 603,000, an increase of 1.3 times and 1.4 times respectively; the production and sales of fuel cell vehicles were 0.2 million, an increase.

There is no doubt that China is the world's largest market for EVs. However, the reason for the continued rise in sales is mainly dependent on China's policy support, which is very strong in terms of financial subsidy for EV technology, application areas, and market expansion. According to a new document issued by the Chinese government in 2022, the policy subsidies for EVs will be gradually reduced until they are completely withdrawn after 2023. This is not good news for the sustainable development of China's EV market.

Research Problems

Although the sales of EVs in China are rising faster and the number of EV registrations has increased significantly, its market share is still much smaller than that of traditional fuel vehicles.

Also, China's subsidy cuts for EVs will be phased in by 2022, until they are completely abolished in 2023. When the subsidy policy is gradually abolished, consumers' enthusiasm for purchasing will drop sharply, and the lack of sustainable growth momentum within the EV will become apparent.

Therefore, promoting the development of EVs continues to have significant difficulties, and key factors affecting the impact of EV consumption must be identified.

Based on the above, the main research questions of this study are the following three:

1. What are the factors influencing the consumption of EVs?
2. How to continuously stimulate consumers' consumption desire?
3. How to maintain sustainable growth of EV market development?

The objective of this study

The rapid development EVs is one of the more important factors in China's efforts to address environmental and energy issues. As the main consumer of EVs, consumers' willingness to purchase largely determines the market development and market share of EVs.

However, existing research on EVs in China is mostly on the industry itself, the construction of public facilities, policy subsidies, and technology. Not much research has

been done on consumer behavior and it is not well developed. For example, there are differences between actual and potential consumers, and the neglect of these differences may lead to some key factors being overlooked. The factors influencing Chinese consumers' consumption of EVs can be collated and analyzed through theories related to consumer behavior. This study focuses on filling in some of the gaps that may have been overlooked by comparing and sorting out the studies of many previous researchers.

These factors can stimulate consumers' desire to consume the product and thus ensure the sustainable development of the product in the market. So, the objective of this study is:

1. to find out what are the factors influencing the consumption of EVs in China, and how much these factors influence the market.
2. These factors will stimulate the consumer desire for EVs in China in the future,
3. and thus give new technical ideas and marketing strategies for the sustainable development of EVs in China.

Scope of the study

This study focuses on Chinese consumers in the EV market and analyzes sales data related to EVs in China. The findings are only applicable within the market of China.

Research Significance

The significance of this study is that the findings of this study can provide an additional point of reference for the research on EVs in the areas of consumer behavior, provide some research ideas for other scholars' future research, and provide strategic references for corporate marketing and reference suggestions for the government.

Theoretical framework

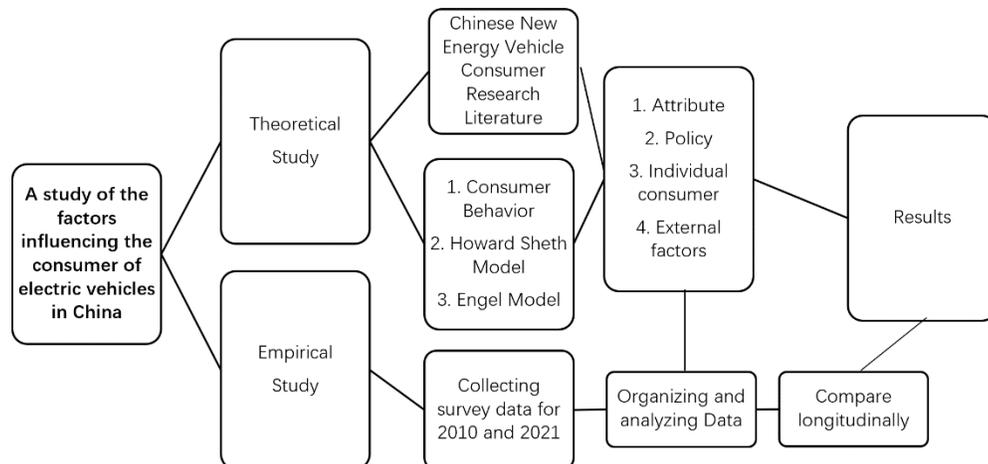


Figure 1. Theoretical framework

Literature Review

Research related to consumer behavior

First, the research on consumer behavior abroad began in the early twentieth century, based on the motivational studies pioneered by psychologist represented by Freud, which provided the basic theoretical approach to the study of consumers and their behavior. In 1968, Messenger and others from Ohio State University published *Consumer Behavior*, and since then consumer behavior has become an independent discipline.

A consumer is a member of society who buys or uses goods and receives services for personal purposes (Kotler & Keller, 2021). Consumers can be divided into potential consumers and real consumers, and the distinction between them is based on their consumption status. A real consumer is a consumer who has already created a demand for a product and has consumed it. Potential consumers are those who have a demand for a product but have not yet consumed it but are likely to do so in the future (Chen, 2004).

Consumer behavior is a consumer activity that is influenced by both internal factors and external factors. The basic characteristics of consumer behavior are autonomy, causality, purpose, persistence, and variability (Paul, 2006).

The study of consumer behavior can build the basis of marketing decisions, which can be of great help in improving marketing decisions and enhancing the effectiveness of marketing strategies. It can support research in the following areas: 1.new product development. 2.product pricing. 3.product positioning. 4. brand image and management. 5.market segmentation. 6.promotion strategy development. 6.development of promotion strategies. 7.determination of distribution channels.

The research on consumer behavior abroad, especially in Western countries, is mainly concerned with the level of value acquisition and consumption, rather than the consumer purchase process of the research object.

The research on consumer behavior in China is relatively late compared to foreign countries, and at first, it was mainly descriptive (Lu, 2005). In the few empirical studies, comparative studies, or tests of consumer behavior in China have been conducted mainly using Western research models in an attempt to build analytical models (Xia, 2006). However, it did not bring a breakthrough to the study of consumer behavior because it drew on foreign analytical models to study consumers in China.

For the consumption behavior of automobiles, its research is mostly at the macro level, the demand for automobile consumption, the characteristics and future development of automobile consumption, the current situation of automobile consumption in a certain region, and the analysis of factors affecting automobile consumption. As for the micro level in the study of Chinese auto consumption, Luan and Chen (2005) used hierarchical analysis to study the factors influencing individual auto consumption decisions. They summarized and categorized a hierarchy of six influencing factors, and by analyzing the data collected from the questionnaire, they concluded that the influencing factors of rationalized decision-making were ranked in order of importance as safety, price, economy, brand, power, and comfort, and the influencing factors of irrational decision making were ranked as after-sales service, national policy, loan cost, urban infrastructure, urban traffic management situation, and emission standard. Yan, Qian, and Yong (2002) conducted an empirical study on the factors of fuel tax affecting auto consumption, and the study showed that the lower the fuel tax, the greater the stimulus to auto consumption. Xing (2002) study found that different social classes or groups have a great impact on auto consumption.

Theories related to consumer behavior

Howard-Sheth model (Howard 1963), this theory focuses on consumer buying behavior from four major factors to consider: stimulus or input factors, external factors, internal factors, and reflecting the output factors. The input factors are external stimuli that allow consumers to receive information, and the stimuli are physical stimuli, symbolic stimuli, and social environment stimuli. After receiving the information, the consumer enters the perception and learning construction part, which refers to the process of how the consumer processes the impressions formed in the brain, plus the consumer's motivation and other factors to generate willingness. The final output part refers to the consumer's purchase behavior after the first two parts, which are attention, brand awareness, attitude, willingness, and purchase behavior.

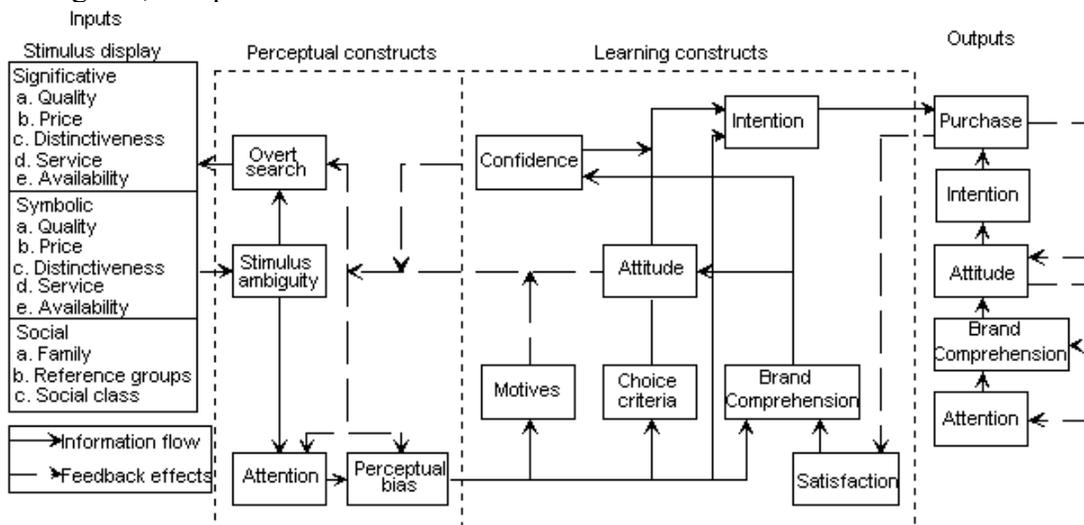


Figure 2. Howard-Sheth model

Engel's model (Engel, Kolkata, Blackwell, 1968) is one of the more complete and clear theories of consumer behavior. The whole model is divided into four parts: central control system, information processing, decision process, and environment. The consumer behavior process begins before the actual consumption occurs and its effects continue until sometime after the consumption behavior is completed. The model considers the consumption process to go through five stages: problem recognition, information gathering, evaluation of available options, consumption decision, and post-purchase behavior.

Research Methodology

This study adopts a mixed research methodology, firstly, through theoretical research, mainly by combing domestic and international research literature on theories related to consumer behavior and the factors influencing the consumption of EV, to summarize which aspects of the consumption influences are mostly concentrated in the Chinese electric vehicle market. The study will then conduct an empirical research analysis, which will compare longitudinally the data from "Electric vehicle Consumption Decisions and Attitudes" (Chevrolet, 2021) and a research report (Zhao, 2010) conducted

10 years ago on Chinese consumers nationwide. These data are from more authoritative corporate and related research for a nationwide consumer population, where respondents were surveyed on various influences such as culture, economy, policy, product quality and personal aspects, etc. The random sampling method is used to collect thousands of valid data online, and the consistency coefficient of each survey dimension is between 0.7 and 0.9 through SPSS analysis, which has a certain degree of consistency and stability and high credibility.

This study analyzes and processes the data of these two surveys, analyzes and organizes the data based on several factors that affect the consumption of EV, which are derived from the previous combing of related theories and literature, makes a longitudinal comparison, and finally put forward relevant suggestions based on the data processing results.

Findings and Conclusion

This study has sorted through the theories of consumer behavior and the research literature of many researchers in this area, and collated the influencing factors in the following four dimensions :

1. Attribute

Many studies on EVs in China have shown that consumers are most concerned about the quality and safety attributes of EVs. As a means of transportation, the basic practicality of a car is to travel, and attributes such as range, supporting infrastructure, quality, and safety, price, and appearance have an impact on purchase intentions. Xue (2020) believes that the product factor is the key factor that determines whether consumers will make a purchase. For EV, the inner quality is reflected by its safety, battery technology, charging efficiency, range, and other indicators, while the outer quality is reflected by the car's decoration and appearance. For example, BYD, the leading company in China's EV, has developed its own blade lithium phosphate battery technology, which is the most trusted battery technology in China's EV and has greatly improved its range. At the same time, the BYD Dynasty series of EVs are very much in line with consumer demand in terms of design.

2. Policy

Since 2012, China's electric vehicle industry has been developing rapidly with the support of policies and a series of subsidies that have led to a rapid increase in its sales. Some scholars have studied the phenomenon of policy influencing consumer behavior. In general, consumers' behavior in purchasing EVs is largely motivated by government subsidies. Government subsidies are mainly divided into two types of subsidies: direct subsidies based on economic subsidies and indirect subsidies based on tax incentives, of which the economic subsidies have the most significant impact on consumers, but both methods have a significant incentive on consumer behavior. On the other hand, EVs also have two policy factors unlimited traffic and easy access to number plates, which are also important factors to attract consumers to buy EVs. However, the latest documents released by the government this year show that government subsidies will be gradually reduced until they are eliminated. So the impact of subsidy policy on the consumption of EVs will

be less necessary in future studies compared to policies such as the unlimited number and unlimited traffic.

3. Individual consumer

The exploration of the personal level of consumers is an important task in consumer behavior research, and it is necessary to guide consumers to get a better development of the electric vehicle industry. For example, Li (2010) concluded that consumers' psychological and product perception factors positively influence their willingness to purchase EVs. Other researchers argue that consumer innovativeness and risk acceptance can influence the consumption of EVs. EVs are innovative products that are new and advanced, but also unstable, and consumers' ability to accept novelty and risk is one of the factors that influence the consumption of EVs. This aspect is also reflected in the influence of demographic variables on purchase intentions. For example, many researchers have found that demographic variables such as age, gender, education, and income have a strong influence on the consumption behavior of EVs. Finally, another important influence at the individual consumer level values, including green values and self-interest values. Consumers with good green values are more willing to buy EVs, which are more in line with their values of energy conservation and ecological protection. Consumers with self-interested values are less interested in the advantages of EVs in terms of energy efficiency and environmental protection, and with the weakening of government subsidies, consumers with self-interested values are more likely to give up buying EVs.

4. External factors

Among the external influencing factors, the consumer influence of EVs is mostly reflected in the influence of the surrounding groups, the after-sales service of car companies, and the promotional advertisements of businessmen. When a consumer buys an electric vehicle that he is not familiar with, the views and opinions of his friends and family around him will have a greater influence on him, while the influence of the car salesman's promotion will have little impact in comparison. Some consumers may even be pressured by their surroundings to buy an electric vehicle, such as an electric vehicle purchased by a good friend, and they are likely to buy an electric vehicle themselves and have the same conversation with their friend. In China, many researchers have found that Chinese consumers are more concerned about aspects such as after-sales, advertising, and promotional activities. For example, Duan (2016) found through questionnaires and statistics that the most significant influence on purchase intentions is the advertising and promotional activities of businesses. In recent years, Tesla's problems in China and the marketing strategies of Chinese companies such as BYD have shown that the image of a good car company has a positive impact on consumers' willingness to buy EVs.

Longitudinal comparison analysis

Based on the above four main consumption influencing factors derived from the collation of consumer behavior theories and related research literature, this study quantitatively analyzes and compares both research data in 2010 and 2021.

After the analysis of this study, the main factors are the battery (range), configuration, appearance, and safety of the car at the attribute dimension, the policies and urban infrastructure of EV at the policy dimension, the consumer's consumption concept and

economic factors at the individual dimension, and the information received at the external

Year	Attributes	Policies	Charging	Environmental Protection	Economic Costs	Recommended by friends	Other
2010	14.9%	21.63%	49.21%	76.92%	61.06%	1.92%	1.44%
2021	59.98%	38.25%	54.87%	18.58%	59.98	29.6%	37.64% (Intelligent)

factor dimension. As shown in Table 1.

Table 1 Longitudinal comparison data

In the 2010 survey, 76.92% of the respondents chose EV for reasons of cleanliness and environmental protection, 61.06% for lower cost of use, 21.63% for government policy, and only 14.9% for reasons of car attributes, friend recommendation, and other reasons. In the 2021 study, the respondents' reasons for choosing EV have changed significantly from 10 years ago. 59.98% of the respondents in 2021 were more attracted by the car's attributes and the cost of using the car, while the factor of clean and environmental protection was only a concern for 18.58% after 10 years, and instead of a new factor, the degree of intelligence of the car, whose attraction to In terms of policies, although subsidies are gradually slipping, policies like license-free and unlimited driving are still a very attractive factor for consumers, reaching 38.25%.

Recommendations

The degree of development of EVs in the Chinese market and consumers' awareness of them has become increasingly high, and most auto consumers now include EVs in their consideration items. Consumers of EVs are also no longer driven by government subsidies and other related policies as they were years ago, but more by the advantages and new sense of experience relative to fuel vehicles.

In terms of government policy, the government should continue to support electric vehicle companies regarding core technology upgrades by relevant electric vehicle laws and regulations and policies.

In terms of product positioning of EV, firstly, the main marketing target should be the consumer group aged 18-30, and the product design should meet the preferences of young consumers and be positioned more avant-garde. Second, most of the consumer groups of EVs have an annual salary of about 100,000 and will pursue the practicality of the car because of the needs of family life. Third, people with a bachelor's degree and above are the main consumers of EV, their consumption concept is more rational, will do a good job of understanding all the product information, to do a good job of after-sales service. Fourth, EVs should focus on the development of low-end products from 100,000 to 200,000.

In the electric vehicle product development innovation, although now China's charging pile facilities are being promoted by government policy to step up construction, the battery life and charging are still the main influence of electric vehicle consumers, in the domestic brand BYD fierce research and development momentum, consumers are more

and more in-depth understanding with the battery, so the manufacturers of EV must ensure safety on the premise of the battery, improve Innovation and R & D capabilities to solve this key factor affecting the consumption of EV. With the development of 5G nowadays, many intelligent functions are not comparable to those of EV, and the degree of intelligence of EV is becoming a more important factor for consumers.

References

- Ajzen, I. (1991). The theory of planned behavior. *Organizational behavior and human decision processes*, 50(2), 179-211.
- Bi, Y. Y. & Zhang, S. B. (2021). Research on factors influencing consumers' willingness to purchase new energy vehicles - based on multivariate ordered logit model. *Journal of Harbin College* (09), 42-45.
- Chen, P. A. (2004). *Introduction to Advertising*. Higher Education Press.
- CNPC. (2019). Domestic and foreign oil and gas industry development report in 2019. <http://www.cnpc.com.cn/cnpc/jtxw/202001/1deb55e58b7b49d3a6f934318fa4c2af.shtml#>
- Egbue, O., & Long, S. (2012). Barriers to widespread adoption of EV: An analysis of consumer attitudes and perceptions. *Energy Policy*, 48, 717-729.
- International Energy Agency. (2018). *Global EV Outlook 2018-towards cross-modal electrification*.
- Kotler, P., Keller, K. L., Ang, S. H., Tan, C. T., & Leong, S. M. (2021). *Marketing management: an Asian perspective*.
- Lu, T.H. (2005). *China Consumer Behavior Report*, Beijing, China Social Science Press. National Bureau of Statistics of China.
- Nelson, P. (1970). Information and consumer behavior. *Journal of political economy*, 78(2), 311-329.
- Wu, J., Liao, H., & Wang, J. W. (2020). Analysis of consumer attitudes towards autonomous, connected, and EV: A survey in China. *Research in transportation economics*, 80(1): 828 - 836.
- Zhang, W., Wang, S., Wan, L., Zhang, Z., & Zhao, D. (2022). Information perspective for understanding consumers' perceptions of EV and adoption intentions. *Transportation Research Part D: Transport and Environment*, 1(02), 103-157.
- Zhao, X., Ma, Y., Shao, S., & Ma, T. (2021). What determines consumers' acceptance of EV: A survey in Shanghai, China. *Energy Economics*, 1(5): 58-65.
- Zheng, C. (2019). EV. In *The Energy Transition in China: Mid-to Long-Term National Strategies and Prospects* (pp. 24–29). Fondazione Eni Enrico Mattei (FEEM).
- Zu, M. & Su, X.J. (2021). A review of research on factors influencing consumers' willingness to purchase new energy vehicles. *Journal of Anhui University of Technology (Social Science Edition)* 3(02), 15-22.