

Research on Influencing Factors of New Energy Vehicle Consumers' Purchase Intention in Anhui Province

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Abstract

Aiming at the research on the influencing factors of consumers' willingness to purchase new energy vehicles in Anhui Province, firstly, through the questionnaire survey, the reliability and validity test, skewness and kurtosis statistical analysis and confirmatory factor analysis were carried out on the collected data; The structural equation analysis model of the influencing factors of new energy vehicle consumers' purchase intention explains the latent variables related to the preferences of potential consumer groups. The results show that six variables such as behavioral attitude and product cognition have different degrees of influence on purchase intention. Finally, based on the results of the empirical analysis, suggestions are put forward for the development of the new energy vehicle industry from the government, enterprise and individual levels.

Keywords

New Energy Vehicles; Purchase Intention; Structural Equation Model; Energy Saving and Emission Reduction.

1. Introduction

With the rapid development of the economy and society, the automobile industry has gradually become one of the important industries in my country, and the residents' demand for automobiles has gradually increased. But at the same time, the environment is deteriorating and air quality is deteriorating, causing people to worry. Therefore, the Chinese government's planning outline proposes the concept of "energy saving and emission reduction", which aims to reconcile the contradiction between the rapid economic development and the deteriorating environment. On this basis, the new energy vehicle industry has developed vigorously, and has been widely favored by citizens for its zero-emission and low-energy consumption features, and has also won strong support from national policies. Compared with traditional fuel vehicles, new energy vehicles are of great significance to the protection of my country's ecological civilization.

Research on the purchase intention of new energy vehicle consumers, Xiao-feng Wang, Zhi-Ming Yu[1] expounded the significance of the development of new energy vehicles from the aspects of energy saving and emission reduction, the development of the automobile industry, etc, and analyzed the development status and main problems of China's new energy vehicles from the aspects of market and policy, and finally looked forward to the future development trend of new energy vehicles. Through research and analysis, Hui-qing Zhao, Yu Hang[2] believe that age, environmental protection behavior and subsidy policy are the most significant factors affecting consumers' purchase of new energy vehicles, but the nature of work, vehicle performance and sales services have little effect on the willingness to buy new energy vehicles. Sheng-li Jun, Xie Tong's[3] research believes that the quality of new energy vehicles, the market environment of the automotive industry and future development prospects are important

reasons for affecting the sales of new energy vehicles. Xian-hui Fang[4] believes that consumers' income level, product factors, policy factors and environmental cognition have an important influence on the purchase intention of potential consumers of new energy vehicles. Zhai Fan[5] believes that when consumers choose new energy vehicles, they pay more attention to the quality, performance and emotional experience of the car after purchase. Ming-lai Li[6] built a structural model and found that government promotion directly affects consumers' willingness to buy, and industrial policies and subsidy policies should be implemented. Foreign scholars' research on the purchase intention of new energy vehicles, Benjamin K[7] believes that cost factors and perceived value affect consumers' willingness to buy, Huibin Du[8] believes that subjective norms and perceived behavior have a decisive impact on the purchase of new energy vehicles. Yi Ping[9] believes that the performance and driving safety of new energy vehicles have an incentive effect on consumption intention, while policy subsidies do not play a decisive role in purchasing intention.

2. Variable Selection and Research Assumptions

2.1. Selection of Variables

In recent years, due to the continuous development of technology and economy, the consumption of new energy vehicles has gradually entered the consumption plan of ordinary working class. The purchase of new energy vehicles is very hot, and the scale of potential consumers is even larger. In order to study the influencing factors of the purchase intention of potential consumers of new energy vehicles, this paper adopts six latent variables: corporate image, product awareness, moral demonstration, media guide, policy subsidies, and behavioral attitudes.

2.2. The Distribution of Survey Data

Table 1. Skewness and Kurtosis Statistics

Variables	Means	Skewness		Kurtosis	
	Statistics	Statistics	Standard Errors	Statistics	Standard Errors
X11	4.315	0.945	0.263	1.28	0.205
X12	3.157	-1.324	0.263	0.893	0.205
X13	3.874	-0.879	0.263	-0.93	0.205
X21	4.372	-1.39	0.263	0.937	0.205
X22	3.874	0.947	0.263	-0.47	0.205
X23	3.945	1.349	0.263	-0.948	0.205
X24	4.021	-0.939	0.263	1.048	0.205
X25	3.759	-0.968	0.263	1.053	0.205
X31	4.205	-0.942	0.263	1.032	0.205
X32	2.329	-1.034	0.263	0.993	0.205
X33	4.329	-0.743	0.263	-0.95	0.205
X41	4.027	0.879	0.263	1.984	0.205
X42	3.892	0.943	0.263	0.974	0.205
X43	3.974	0.957	0.263	-0.47	0.205
X51	4.074	1.038	0.263	-0.958	0.205
X52	3.924	1.094	0.263	-0.963	0.205
X61	4.038	-1.083	0.263	1.074	0.205
X62	3.894	0.958	0.263	1.082	0.205

Ensure that the estimated value of parameters will not have too large deviation. Kurtosis and skewness are usually used to describe whether the variable is normal distribution. The larger the absolute value of the data, the more significant the non normal distribution of the corresponding data. However, in the specific discussion, it is very difficult to make all the data conform to the normal distribution. In some related studies, it is proposed that only a single variable can meet this requirement, and the results obtained by the structural equation model in the form of maximum likelihood estimation are still credible. In this paper, the skewness and kurtosis of sample data are analyzed by SPSS, Generally, the requirement of normal distribution is that the absolute value of skewness is within 2 and the kurtosis is between 1 and 3. The minimum value of skewness in this sample data is -1.39 and the maximum value is 1.349, The minimum value of kurtosis is -0.963 and the maximum value is 1.984, which meets the requirements of normal distribution and can be modeled by structural equation. The statistical table of skewness and kurtosis is shown in Table 1.

Among them, X11, X12, X13 represent the observed variables of 'corporate image', X21, X22, X23, X24, X25 represent the observed variables of 'product awareness', X31, X32, X33 represent the observed variables of 'moral demonstration', X41, X42, X43 represent the observed variables of 'media guide', X51 and X52 represent the observed variables of 'policy subsidies', and X61, X62 represent the observed variables of 'behavioral attitudes'.

2.3. Research Hypothesis

By summarizing and summarizing theoretical knowledge, and according to the actual situation of the new energy vehicle consumption market in Anhui Province, the following assumptions are made for this research: (1) Corporate image has a positive impact on product cognition, (2) Consumers' perception of new energy vehicles has a positive impact on their behavioral attitudes, (3) Moral demonstrations obtained by consumer groups have a positive impact on behavioral attitudes, (4) Media guide has a positive impact on moral demonstration, (5) Policy subsidies have a positive impact on behavioral attitudes, (6) Behavioral attitudes have a positive impact on behavioral outcomes.

3. Model Construction and Validation

3.1. Structural Equation Modeling

In this paper, AMOS24 software is used to model and calculate the factors that affect the purchase intention of potential consumers of new energy vehicles, and a structural equation model is constructed with reference to Chinese and foreign research on the influencing factors of consumers' purchase intention. The structural equation analysis is shown in Figure 1.

3.2. Reliability and Validity Test

This paper uses the Cronbach's Alpha coefficient method to analyze the reliability. This method shows that as long as the Cronbach's Alpha coefficient is greater than 0.7, it means that each measurement item of the questionnaire has good reliability, the questionnaire scale is acceptable, and the reliability test is passed. The validity analysis of this paper is measured by KMO standard value. When the KMO value is greater than 0.6, the questionnaire is acceptable; if the KMO value is less than 0.6, the questionnaire is not very good and cannot pass the validity test. We performed factor analysis on 6 latent variables through spss, and selected KMO value and Bartlett sphericity test. The results of the latent variable reliability and validity analysis are shown in Table 2.

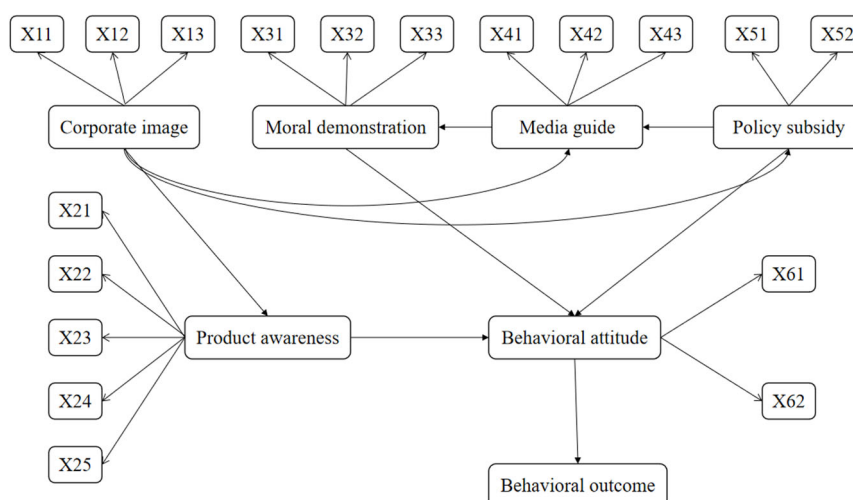


Figure 1. Structural Equation Model Analysis Diagram

Table 2. Reliability and Validity Analysis of Variables

Variable	Number of Questions	Cronbach's Alpha	KMO	Sig
Corporate Image	3	0.806	0.799	0
Product Awareness	5	0.784	0.695	0
Moral Demonstration	3	0.847	0.745	0
Media Guide	3	0.753	0.68	0
Policy Subsidies	2	0.794	0.705	0
Behavioral Attitudes	2	0.744	0.684	0

It can be clearly seen that the Cronbach's Alpha value of the six variables is greater than 0.7, indicating that through the reliability test, the data has good reliability as a whole. In addition, the KMO values are all greater than 0.6, indicating that the data validity is good, and the questionnaire measurement items reflect the actual situation well. The validity test is passed, and the data of the questionnaire is valid.

3.3. Confirmatory Factor Analysis

After the above reliability and validity tests have passed, in order to further judge the reliability and validity of the questionnaire, we use the structural equation model analysis software Amos for confirmatory factor analysis. Confirmatory factor analysis is to verify whether our hypothetical model structure is consistent with the actual situation through sample data. Ave refers to the average spot check of each factor, and its value reflects the convergence validity of the measurement item. Its critical value is 0.5. In this study, the ave value is between 0.52 and 0.6, all exceeding 0.5, indicating that the measurement item has high convergence and differential validity. CR is group reliability, which represents the index value of internal consistency reliability quality. The larger its value, the stronger the correlation between items, and the stronger the explanatory ability of potential variables to them, the better the internal heterogeneity. The CR value is greater than 0.7, which indicates that the factor reliability is good. The CR values of this study are close to or greater than 0.7, so it can be judged that the internal heterogeneity is better. The validation factor analysis results are shown in Table 3.

Table 3. Validation Factor Analysis

Variable	Model parameter estimates				convergent validity	
	Estimate	S.E.	C.R.	P	CR	AVE
X11	1	--	--	--	0.871	0.627
X12	0.954	0.068	15.972	***	--	--
X13	1.083	0.068	15.336	***	--	--
X21	1	--	--	--	0.899	0.691
X22	0.976	0.059	16.221	***	--	--
X23	0.986	0.068	15.524	***	--	--
X24	1.065	0.068	14.181	***	--	--
X25	0.96	0.058	17.09	***	--	--
X31	1	--	--	--	0.844	0.576
X32	1.125	0.071	13.537	***	--	--
X33	0.958	0.069	15.524	***	--	--
X41	1	--	--	--	0.828	0.618
X42	1.067	0.107	9.994	***	--	--
X43	1.072	0.112	11.26	***	--	---
X51	1	--	--	--	0.716	0.458
X52	0.873	0.103	9.363	***	--	--
X61	1	--	--	--	0.799	0.499
X62	1.125	0.152	7.122	***	--	--

4. Empirical Analysis

4.1. Degree of Freedom Test

Before solving the constructed model path coefficient, it is necessary to perform model identification. The identification results are shown in Table 4. From the degree of freedom test data, it can be seen that the model data point is 437, and the free parameter 85 is smaller than the model data point 437, indicating that the model can be identified.

Table 4. Structural Equation Degrees of Freedom Test

Inspection Item	Value
Model Data Points	437
Parameter Quantity	85
Degrees of Freedom	342
Chi-square Value	1649.865

4.2. Solving for Path Coefficients and Covariances

After the degree of freedom test, the model is calculated and solved, and the standardized path coefficient and covariance-related information of the model are obtained. The specific results are shown in Figure 2.

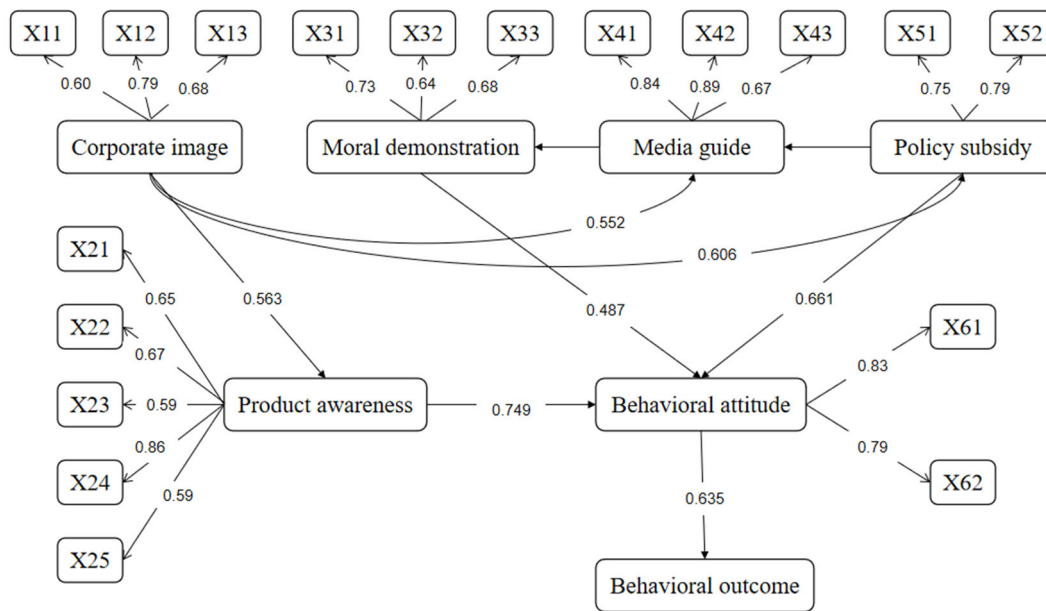


Figure 2: Structural Equation Path Coefficients and Covariances

From Figure 2, we know the path coefficient of A: (product awareness<---corporate image) is 0.563, the path coefficient of B: (behavioral attitude <--- product awareness) is 0.749, the path coefficient of C: (moral demonstration <---media guide) is 0.475, and the path coefficient of D: (behavioral attitude<---policy subsidy) is 0.661, the path coefficient of E: (behavior attitude <--- moral demonstration) is 0.487, and the path coefficient of F: (behavior result <--- behavior attitude) is 0.635.

The significance test of the path coefficient of the structural equation model is carried out. Generally, the P value or the C.R. value is used to judge whether the path is significant. The C.R. value is equal to the t-value of the t-test for the critical ratio, and if the C.R. value is greater than 1.96, it is significant at the 0.05 level of significance. If the P value is less than 0.001, the system will use "****" to indicate, otherwise the numerical value will be displayed directly. According to this, it is concluded that the C.R. value of (behavioral attitude <--- product awareness) is less than 1.96, which is not significant, so this path should be eliminated. The significance test results are shown in Table 5.

Table 5. Structural Equation Model Path Coefficients and Significance Levels

Path	Estimate	S.E.	C.R.	P	normalized path coefficients	Validation results
A	0.488	0.041	11.811	***	0.563	Accept
B	0.726	0.089	0.291	0.771	0.749	Reject
C	0.065	0.028	2.327	0.02	0.475	Accept
D	0.632	0.08	7.932	***	0.661	Accept
E	0.504	0.055	9.144	***	0.487	Accept
F	0.351	0.061	5.781	***	0.635	Accept

4.3. Hypothesis Testing Summary

The previous research on the model made relevant assumptions, and the final results of the relevant hypothesis verification are detailed in Table 6.

Table 6. Null Hypothesis Verification

Null Hypothesis	Conclusion
Corporate image has a positive impact on product cognition	Accept
Consumers' perception of new energy vehicles has a positive impact on their behavioral attitudes	Reject
Moral demonstrations obtained by consumer groups have a positive impact on behavioral attitudes	Accept
Media guide has a positive impact on moral demonstration	Accept
Policy subsidies have a positive impact on behavioral attitudes	Accept
Behavioral attitudes have a positive impact on behavioral outcomes.	Accept

5. Conclusions and Suggestions

5.1. Conclusions

This paper analyzes and empirically studies the purchase intention behavior of potential consumers of new energy vehicles in Anhui Province through structural equation modeling. First, it expounds the existing research results of the purchase behavior of new energy vehicles at home and abroad, and summarizes it. Under this premise, three classical behavioral theoretical models were combined to construct a structural equation model, and the method of questionnaire research was used to collect relevant data. After analyzing the modeling and passing the relevant tests, based on the results of the model and combining the actual situation, the corresponding research results are obtained:

- (1) Consumers' purchase behavior of new energy vehicles is affected by their behavior and attitude, and the intensity of the impact on behavior and attitude is moral demonstration and policy subsidy in turn. Media guide has a decisive impact on moral demonstration. Similarly, corporate image also plays a decisive role in product cognition.
- (2) The government and the media still need to continue to guide public opinion to enhance the spiritual utility of new energy vehicle consumers.
- (3) Differentiated product design and marketing strategy of target groups. For ordinary wage earners, their purchasing power should be fully considered, and the actual travel needs of such groups should be deeply studied and analyzed; For high-income groups, private customization is carried out according to their personal preferences to enhance their preference for new energy vehicles and reduce narrow understanding.

5.2. Suggestions

- (1) At the national level, it is of critical significance to improve the construction of energy-saving and emission-reduction infrastructure to stimulate the demand for new energy electric vehicles. The government should also formulate a scientific industrial development strategy, strictly control the market access threshold, establish standardized laws and regulations, increase supervision, and promote the healthy and long-term development of the industry.
- (2) New energy vehicle companies should increase capital investment in research and development, and strive to improve the problems of low battery use efficiency and long charging time, increase economies of scale and reduce manufacturing costs. Enterprises should also replenish the emerging needs of consumers in a timely manner, collect information from consumers, improve the after-sales service system, and continuously upgrade products that meet market demand.
- (3) The public's consumption thinking must keep pace with the times, and pay attention to the development of the new energy vehicle industry with a more open and inclusive attitude. The majority of consumers should also actively respond to the national call, advocate low-carbon

transportation, green travel, and consciously establish energy saving and emission reduction awareness. Cultivate the values of low-carbon consumption and form a social atmosphere of low-carbon economy.

Acknowledgments

This study was funded by The National Social Science Fund Project of China (21CTJ024), and the Teaching and Research Fund Project of the Anhui University of Finance and Economics (acjyyb2020011 and acjyyb2020014).

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