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The Impact of Environmental Policies and Usage Expectations on Residents' Intention to Purchase New Energy Vehicles in Guangxi Zhuang Autonomous Region

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Abstract

New energy vehicles are emerging as a sustainable alternative to reduce gasoline consumption and emissions in the transportation sector. To address environmental challenges, governments worldwide have introduced a range of policies to promote the production and adoption of new energy vehicles (NEVs). However, some policies may require updates and modifications to meet consumers' changing demands and the NEV industry's performance that matches consumer expectations. Utilizing an innovative online questionnaire, this study investigates the impact of environmental policy and usage expectations on NEV sales in the Guangxi Zhuang Autonomous Region and its relationship with consumer purchase intention. The hypotheses were tested using data from 402 respondents in China. The results of this study highlight the role of government policy, perceived usefulness, and perceived ease of use in influencing consumers' purchase intention on NEVs.

Keywords : *Environmental Policies and Usage Expectation, Purchase Intention, New Energy Vehicles*

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INTRODUCTION

Since China's economy has increased after the reform and opening up, energy consumption and carbon emissions have continued to grow. New energy is being developed to meet current and future energy needs and address global environmental and climate change challenges. Here are some of the main reasons for the development of new energy sources (Yu et al., 2019):

1. Energy demand increase: The growing global population and economic development have increased energy demand. However, traditional energy resources such as oil, natural gas, and coal are limited and will eventually run out. Therefore, developing new energy sources is necessary to meet the growing energy demand and ensure the sustainability of the energy supply (Zhang et al., 2018).
2. Environmental benefits: Traditional energy sources produce many pollutants and greenhouse gas emissions, causing severe environmental damage. For example, burning fossil fuels releases greenhouse gases such as carbon dioxide, contributing to climate change and global warming. However, new energy sources for automobiles can significantly reduce or even eliminate the emission of these pollutants, offering a brighter, cleaner future for our environment (Zhen et al., 2017).
3. Energy security: Local political, economic, and natural factors affect traditional energy supply. China, which relies on imports, may face the risk of energy supply interruptions, which can threaten national security and financial stability. Developing new energy sources

for vehicles can reduce dependence on traditional energy, improve sustainable energy, and enhance energy security (Zhang et al., 2017)

4. Economic prosperity: Developing new energy industries creates numerous job opportunities and stimulates economic growth and technological innovation. The research, development, and application of new energy vehicles can drive the growth of related industries, foster the transformation and upgrading of the economic structure, and enhance China's market competitiveness, painting a promising picture of economic prosperity (Zhou et al., 2015).

This study explores the consumer purchase intention of NEVs under the influence of environmental policies and usage expectations with the following objectives:

1. To examine the influencing mechanisms of Guangxi Zhuang Autonomous Region purchase intention of NEVs based on government policy, perceived usefulness, and perceived ease of use under the environmental policy and usage expectations.
2. To provide feasible feedback to NEV dealerships to improve consumer satisfaction and perceptions of NEV purchases as an enhancement to the environment and sustainable usage.

Therefore, this study aims to determine the effect of three independent variables, government policy, perceived usefulness, and perceived ease of use, on the dependent variable of consumer purchase intention.

THEORITICAL FOUNDATION

4Cs of Marketing

It is consumer demand-oriented and resets the four essential elements of the marketing mix: Consumer, Cost, Convenience, and Communication. It emphasizes that enterprises should first pursue customer satisfaction, secondly, strive to reduce customers' purchase costs, an then fully pay attention to the convenience of the customer's purchase process rather than deciding sales channel strategies from the perspective of the enterprise; finally, effective marketing communications should also be implemented with a consumer focus (Ma et al., 2023). Compared with the product-oriented 4P theory, the 4C theory has dramatically progressed and developed. It attaches great importance to customer orientation and pursues customer satisfaction as its goal. This is a market perspective in which consumers increasingly take the initiative in marketing today. An inevitable requirement of the enterprise. It highlights the crucial factors of customer, cost, convenience, and communication and focuses on finding and meeting consumer needs. However, the market economy also has a competitive orientation. Enterprises must not only see demand but also need to pay more attention to competitors (Liu & Zhou., 2022).

Technology Acceptance Model (TAM)

The Technology Acceptance Model is a widely used framework that explains the factors influencing the acceptance and adoption of new technologies in the workplace (Davis, 1989). According to this model, two main determinants affect the likelihood of using a particular system: perceived usefulness and ease of use. Perceived usefulness is the extent to which a person believes that using the system will improve their work performance, while perceived ease of use is the degree to which a person finds it easy to use the system. The model suggests that system usage is determined by behavioral intention, which is, in turn, influenced by attitude toward using and perceived usefulness. Attitude toward using is determined by perceived usefulness and ease of use (Wilson et al., 2021). On the other hand, perceived usefulness is jointly determined by the perceived ease of use and external variables. External variables refer to system design characteristics, user characteristics (such as personality traits), task characteristics, policy influences, organizational structure, and other factors impacting an individual's beliefs, attitudes, and intentions. The model

emphasizes the importance of establishing a relationship between individual differences, environmental constraints, and controllable interference factors to understand better the dynamics of technology acceptance and usage (Wilson et al., 2021).

Unified Theory of Acceptance and Use of Technology (UTAUT)

The UTAUT model, the Unified Theory of Acceptance and Use of Technology, is a widely used theoretical framework for studying information technology user acceptance and usage behavior. This model was proposed by Venkatesh et al. (2003), and it integrates multiple theoretical models, including the Technology Acceptance Model (TAM), Theory of Planned Behavior (TPB), and Innovation Diffusion Theory (IDT), to provide a comprehensive perspective for understanding users' acceptance of information technology. The UTAUT model comprises four core elements: performance expectations, effort expectations, social influence, and facilities. These factors work together to influence users' acceptance and usage behavior of information technology. Performance expectation refers to the degree to which users believe using specific information technology can improve work performance. Effort expectation refers to the degree of effort required to use information technology. Social influence refers to the degree of social pressure when using information technology, while convenience refers to the degree of organizational support for users to use information technology. The UTAUT model provides a valuable framework for researchers and practitioners to better understand user adoption and usage behavior by considering various factors influencing users' acceptance of information technology. Additionally, the UTAUT model can help organizations design and implement effective strategies to promote the adoption and usage of information technology among their users (Rezvani et al., 2018)

Terms

1. Measuring purchase behavior is challenging, so scholars have focused on purchase intention as a reliable indicator of future behavior. The relationship between purchase intention and behavior is complex, as it involves the interplay between conscious thought and actual behavior. While conscious thought does not always translate into behavior, it can be a useful predictor. As a result, research on purchase intention has gained prominence in recent years as a means of better understanding consumer behavior (Zhang et al., 2020).
2. Government policies are regulations set by state organs, political parties, and other social and political groups to achieve the interests and will of the classes and strata they represent. These policies reflect the principles, precise tasks to be accomplished, working methods, general steps, and specific measures to be taken in a particular historical period. They can be guidelines for action formulated by a country or a political party to achieve goals or guidelines and regulations that should be followed for specific events, phenomena, or plans. Policies are conceptual, subjective, and practical reflections that aim to realize the lines and tasks of a particular historical period (Zhou et al., 2020).
3. Perceived usefulness is evaluating a product or service's value and utility by users based on their subjective experience. It is a crucial factor in product design, directly impacting user satisfaction and loyalty. The expectations and needs of users significantly influence perceived usefulness. If a product satisfies user needs, it will be perceived as valuable and easy to use. Furthermore, the user experience, including product appearance design and interaction methods, is critical in perceived usefulness. A good user experience enhances user satisfaction and loyalty towards the product (Pang et al., 2023). User feedback, such as reviews, comments, and suggestions, is essential for improving the product and increasing its perceived usefulness.
4. Perceived ease of use refers to how simple and intuitive a product or service is. A product or service with good usability means that users can easily understand and use it without

excessive training or guidance. Usability also focuses on the efficiency and satisfaction of users while completing specific tasks. Ease of use can be achieved through good interface design, clear operating procedures, simplified functions, and options that help to improve user satisfaction and usage while reducing learning costs and error rates. Moreover, options help improve user satisfaction and usage while reducing learning costs and error rates (Lim& Weissmann., 2023).

HYPOTHESIS

The Effect of Government Policy on Purchase Intention in NEVs

The government has implemented a car purchase subsidy policy to encourage the adoption of new energy vehicles. This measure provides a direct and visible incentive to car buyers, who can benefit from a specific subsidy when purchasing a new energy vehicle (Wang et al., 2017). Research indicates that this policy has positively impacted 80% of consumers, who reported that it influenced their decision to purchase a new energy vehicle. By reducing the cost of purchasing such vehicles, this policy has increased consumers' willingness to buy and helped promote the market's rapid growth (Dong & Liu., 2020).

H1. Government policy significantly impacts purchase intention in NEV for Guangxi residents.

The Effect of Perceived Usefulness on Purchase Intention in NEVs

The needs and expectations of users when purchasing NEVs play a crucial role in determining the perceived usefulness of a product (Huang & Ge., 2019). If a product can cater to the requirements of its users, it will be considered valuable and easy to use. Furthermore, the user experience, which includes the design, interaction methods, and other aspects of the product, significantly impacts its perceived usefulness. A product with a good user experience can increase user satisfaction and loyalty. Additionally, user feedback, such as reviews, opinions, and suggestions, can be immensely helpful in improving the product and enhancing its perceived usefulness (White & Sintov., 2017).

H2. Perceived usefulness significantly impacts purchase intention in NEV for Guangxi residents.

The Effect of Perceived Ease of Use on Purchase Intention in NEVs

Perceived ease of use pertains to an individual's subjective evaluation of how effortless it is to utilize a system or technology with minimal physical and cognitive exertion, as researched by Jing et al. (2020). If consumers perceive that using a particular technology necessitates significant effort or expertise, their perceived ease of use will be negatively impacted. Conversely, an online purchasing platform that demands little effort to navigate is deemed to have a high level of perceived ease of use. The convenience and comfort experienced while using a platform play a pivotal role in shaping its ease of use (Chatterjee & Kumar., 2020).

H3. Perceived ease of use significantly impacts purchase intention in NEV for Guangxi residents.

CONCEPTUAL FRAMEWORK

China's new energy vehicle industry has grown from scratch to thriving in 30 years. The success is attributed to key players like engineering and technical personnel, adventurous entrepreneurs, government policy support, an optimized market environment, and increasing consumer awareness. The industry is rapidly growing, and the dual-carbon strategy has led to the popularization of new energy vehicles in Guangxi. The region is taking multiple measures to

promote the industry's development and implement the strategy of strengthening the West through the sector.

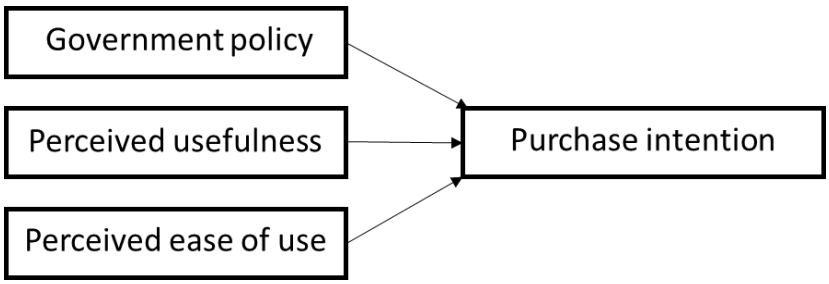

Figure 1. The Conceptual Framework

RESEARCH METHODS

Population and Sample

The individuals studied in this research are consumers residing in Guangxi Zhuang Autonomous Region, China. These consumers have switched to using New Energy Vehicles (NEVs) due to their environmental concerns and usage expectations. The data for this study was collected in January 2024 through the WeChat Survey Platform, and a sample size of 398 individuals was analyzed.

This study's minimum research sample size is based on the following formula, widely accepted for analysis.

1. The margin of error (confidence interval) – 95%
2. Standard deviation 0.5
3. 95% - Z Score = 1.96
4. Sample size formula = (Z-score) ^{2} * Std Dev*(1-StdDev) / (margin of error) ^{2}
5. (1.96) ^{2} x 0.5(0.5) / (0.05) ^{2}
6. (3.8416 x 0.25) / 0.0025
7. 0.9604 / 0.0025 = 384
8. 384 respondents would be needed for this study based on a confidence level of 95%

Research Model

Regression analysis is a statistical method for analyzing the relationship between multiple independent variables of a hypothesis and a set of dependent variables. It also assesses the strength of relationships between variables and models future relationships between them. SPSS23.0 was used to include the test of correlations coefficient of determination, multiple linear regression, and testing this study's hypotheses.

RESULT AND DISCUSSION

Regression analysis of various variables on purchase intention

The model summary is as follows: the coefficient of determination (R) is 0.929, the coefficient of determination adjusted for the number of predictors (R2) is 0.913, and the adjusted R2 is 0.916. This indicates that the model can explain 91.6% of the variation in purchase intention based on factors such as government policy, perceived usefulness, and perceived ease of use. Additionally, the Durbin-Watson test result is 1.968, approximately equal to 2, suggesting no autocorrelation in the residuals, and the model is unaffected by serial correlation problems.

Table 1. Summary of the regression analysis model of constructs and purchase intention

Model	R	R ²	Adjust R Square	Standard estimate error	Durbin-Watson
1	0.929a	0.913	0.916	0.90445	1.968

Based on the results of the single-factor analysis, it is observed that there are significant differences between the independent and dependent variables. The regression sum of squares is 5523.668, and the residual sum is 223.416. The significance of this study is 0.000, which is less than the significance level of 0.01. This implies a considerable effect between government policy, perceived usefulness, perceived ease of use, and purchase intention.

Table 2. ANOVA

	Model	Sum of Squares	df	Mean Square	F	Sig.
1	Regression	5523.668	3	3378.288	4266.232**	.000c
	Residual	223.416	393	.227		
	Total	5747.084d	397			

** p ≤ .01

a. Dependent variable: Purchase intention
b. Predictor variables: government policy, perceived usefulness, and perceived ease of use

Table 3. Multiple Linear Regression Analysis Test

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	4.228	1.335		4.339	.003
	Economic level	.389*	.026	.397	1.382	.001
	Emotional level	.287**	.017	.302	1.668	.005
	Personal level	.428*	.029	.447	3.263	.002

*p≤0.05

a. Dependent Variable: Purchase intention
b. Predictor variables: government policy, perceived usefulness, and perceived ease of use

The regression equation of the multiple linear regression analysis

$$Y = \alpha + ßX1 + ßX2 + ßX3 + e$$

$$Y = 0.389\ X1 + 0.287\ X2 + 0.428\ X3$$

Description:
Y = Purchase Intention
α = Constant
X1 = Government policy
X2 = Perceived usefulness
X3 = Perceived ease of use

e = Error
ß1 = First Regression Coefficient Number
ß2 = Second Regression Coefficient Number
ß3 = Third Regression Coefficient Number

The coefficient table shows the government policy, perceived usefulness, perceived ease of use, and purchase intention after adding constants to the inequality. It can be concluded that there is a significant influence between these levels.

Interpretation of Research Results

Consumers play a crucial role in the relationship between government policies, perceived usefulness, and perceived ease of use when purchasing new energy vehicles. This mechanism aims to improve the environment and behavior regarding usage. The role of consumers in the relationship between government policies, perceived usefulness, and perceived ease of use cannot be overstated when it comes to encouraging and promoting the adoption of new energy vehicles. By demonstrating a willingness to embrace cleaner and more sustainable modes of transportation, consumers play a critical role in shaping government policies and driving innovation in this sector. Specifically, when consumers perceive new energy vehicles as valuable and easy to use, they are more likely to consider purchasing them and incorporating them into their daily lives. This, in turn, can help to reduce carbon emissions, improve air quality, and promote more sustainable transportation practices. Ultimately, this mechanism aims to create a more sustainable, efficient, and environmentally friendly transportation system that benefits all stakeholders, including consumers, governments, and the planet.

The Impact of Government Policy on Purchase Intention

The result of testing the first hypothesis indicates that government policy significantly impacts the purchase intention of NEVs based on the standard regression coefficient of the economic level, which is 0.389, t=1.382, and the significance level is 0.024<0.05. It shows that government policy significantly impacts purchase intention.

The Impact of Perceived Usefulness on Purchase Intention

The result of testing the second hypothesis indicates that perceived usefulness significantly impacts the purchase intention of NEVs based on the standard regression coefficient of emotional level is 0.287, t=1.668, and the significance level is 0.002<0.01. It shows that the perceived usefulness significantly impacts purchase intention.

The Impact of Perceived Ease of Use on Purchase Intention

The result of testing the third hypothesis indicates that perceived ease of use significantly impacts the purchase intention of NEVs based on the standard regression coefficient of personal level is 0.428, t=3.263, and the significance level is 0.018<0.05. It shows that the individual level significantly impacts purchase intention.

CONCLUSIONS

Research Results

H1 Government policy significantly impacts purchase intention in NEV for Guangxi residents.

H2 Perceived usefulness significantly impacts purchase intention in NEV for Guangxi residents.

H3 Perceived ease of use significantly impacts purchase intention in NEV for Guangxi residents.

Managerial Implications:

The results showed that environmental policy portfolios and consumers' perceptions are important determinants of their NEV purchase intention. All other factors of perceived usefulness and perceived ease of use positively affect purchase intention. Meanwhile, consumers' perceptions directly mediate between policy portfolios and NEV purchase intention. In future research, specific groups of NEVs must be addressed in terms of their quality, functionality, and utilities, as experienced by consumers of various types and brands of NEV products. The current study shows that different subclass policies and their portfolios affect consumer NEV purchase intention through their perceived usefulness and ease of use. However, it is unclear whether perceived risks and damaging utilities play a critical role in the effect of policy portfolios on purchase intention. Future work can investigate and distinguish this aspect further.

REFERENCE

Chatterjee, S., & Kumar, K. A. (2020). Why Do Small and Medium Enterprises Use Social Media Marketing and What Is the Impact: Empirical Insights from India. International Journal of Information Management, Vol 53(March), 102103. https://doi.org/10.1016/j.ijinfomgt.2020.102103.

Davis, F. D. (1989). Perceived usefulness, perceived ease of use, and user acceptance of information technology. MIS Quarterly, pp.319–340.

Dong, F., & Liu, Y. (2020). Policy evolution and effect evaluation of new-energy vehicle industry in China. Resour. Policy, Vol 67, 101655.

Huang, X.Q., & Ge, J. P. (2019). Electric vehicle development in Beijing: An analysis of consumer purchase intention. J. Clean. Prod, Vol 216, pp.361–372.

Jing, P., Xu, G., Chen, Y., Shi, Y., & Zhan, F. (2020). The Determinants Behind the Acceptance of Autonomous Vehicles: A Systematic Review. Sustainability (Switzerland), Vol 12(5). https://doi.org/10.3390/su12051719.

Lim, W. M., & Weissmann, M. A. (2023). Toward a theory of behavioral control. Journal of Strategic Marketing, Vol 31(1), pp.185–211.

Liu, J., & Zhou, S. (2022). Analysis of China's New Energy Vehicle Market Competitive Strategy: Taking Tesla and NIO as Examples. 2022 7th International Conference on Social Sciences and Economic Development (ICSSED 2022), Vol 652, pp.356–362.

Ma, H., Wang, J., Wen, K., & Zhang, C. (2023). Analysis of China's New Energy Vehicle Marketing Strategy. 5th International Conference on Innovations in Economic Management and Social Science, Vol 43.

Pang, J., Ye, J., & Zhang, X. (2023). Factors influencing users' willingness to use new energy vehicles. PLoS ONE, Vol 18(5): https://doi.org/10.1371/journal.pone.028581.

Rezvani, Z., Jansson, J. & Bengtsson, M. (2018). Consumer motivations for sustainable consumption: The interaction of gain, normative and hedonic motivations on electric vehicle adoption. Business Strategy and the Environment, 27(8), 1272-1283.

Venkatesh, V., Morris, G. M., Davis, G. B., & Davis, F. D. (2003). User Acceptance of Information Technology: Toward a Unified View. MIS Quarterly, Vol 27 No 3, pp.425-478.

Wang, Z., Zhao, C., Yin, J., & Zhang, B. (2017). Purchasing intentions of Chinese citizens on new energy vehicles: How should one respond to current preferential policy? J. Clean. Prod, Vol 161, pp.1000–1010.

White, L.V., & Sintov, N. D. (2017). You are what you drive: Environmentalist and social innovator symbolism drives electric vehicle adoption intentions. Transp. Res. Part A Policy Pract, Vol 99, pp.94–113.

Wilson, N., Alvita, M., & Wibisono, J. (2021). The Effect of Perceived Ease of Use and Perceived Security Toward Satisfaction and Repurchase Intention, Jurnal Muara Ilmu Ekonomi dan Bisnis, Vol. 5 No. 1, pp. 145-159. http://dx.doi.org/10.24912/jmieb.v5i1.10489.

Wilson, N., Ken, K., & Tan, P. (2021). The Role of Perceived Usefulness and Perceived Ease-of-Use Toward Satisfaction and Trust which Influence Computer Consumers' Loyalty in China. Gadjah Mada International Journal of Business, Vol 23(3), 262–294.

Yu, P. Zhang, J, Yang, D., Lin, X., & Xu, T. (2019). The Evolution of China's New Energy Vehicle Industry from the Perspective of a Technology–Market–Policy Framework. Sustainability, Vol 11, pp.1711.

Zhang, L., & Qin, Q. (2018). China's new energy vehicle policies: Evolution, comparison and recommendation. Transp. Res. Part A Policy Pract, Vol 110, pp.57–72.

Zhang, L., Cude B. J., & Zhao, H. (2020). Determinants of Chinese consumers' purchase intentions for luxury goods. International Journal of Market Research, Vol 62(3), pp.369–385.

Zhang, X.; Liang, Y.; Yu, E.; Rao, R.; Xie, J. Review of electric vehicle policies in China: Content summary and effect analysis. Renew. Sustain. Energy Rev. 2017, 70, 698–714.

Zhen, W., Qin, Q., Wei, Y. M. (2017). Spatio-temporal energy consumption-related GHG emissions patterns in China's crop production systems. Energy Policy, Vol 104, pp.274–284.

Zhou, N., Wu, Q., & Hu, X. (2020). Research on the Policy Evolution of China's New Energy Vehicles Industry. Sustainability 2020, Vol 12(9), pp.3629; https://doi.org/10.3390/su12093629.

Zhou, Y., Wang, M., Hao, H., Johnson, L., Wang, H., & Hao, H. (2015). Plug-in electric vehicle market penetration and incentives: A global review. Mitig. Adapt. Strategy. Glob. Chang, Vol 20, pp.777–795.