

A MODEL OF THE MEDIATING EFFECT OF PERCEIVED VALUE ON THE RELATIONSHIP BETWEEN TECHNICAL CHARACTERISTICS, POLICY INCENTIVES AND THE INTENTION TO PURCHASE NEW ENERGY VEHICLES IN GUANGXI, CHINA

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ABSTRACT

In the context of technological innovation and governmental backing, China's new energy vehicle (NEV) industry is experiencing a phase of accelerated growth. This study develops a model to investigate the mediating role of perceived value in the relationship between technical characteristics, policy incentives, and consumer purchase intentions for NEVs. Utilizing data collected from a survey of NEV consumers in Guangxi, the study applies a structural equation model to analyze the interactions between key latent variables, including technical characteristics, policy incentives, perceived value, and purchase intention. The findings reveal that perceived value acts as a mediator between technical characteristics and purchase intention, as well as between policy incentives and purchase intention. These insights offer theoretical foundations for NEV manufacturers regarding product development and marketing strategies, while also providing practical recommendations for policymakers in formulating NEV-related policies.

Keywords: Technical Characteristics, Policy Incentives, Perceived Value, Purchase Intention

INTRODUCTION

Over the past ten years, China's new energy vehicle (NEV) industry has evolved from non-existence to a phase of rapid expansion, moving from gradual to accelerated development. In 2009, the Chinese government initiated its first pilot project aimed at demonstrating and promoting NEVs. This was followed by several policy measures, including vehicle purchase subsidies, tax incentives, and infrastructure improvements, which spurred market demand for NEVs. Although early NEVs encountered hurdles like high costs, undeveloped technology, and insufficient infrastructure, these policy incentives proved to be critical. Consumer perceptions of NEVs also changed gradually.

At present, the NEV industry is experiencing rapid expansion, largely fueled by progress in intelligent and connected technologies, which have greatly enhanced market acceptance. In 2022, China's NEV sales represented 59.6% of global sales, showcasing the industry's impressive growth. The perceived value of NEVs among consumers is steadily increasing,

particularly due to intelligent features and autonomous driving technologies, which significantly improve the driving experience. Meanwhile, policy incentives continue to play a vital role in driving market growth. Although vehicle purchase subsidies are being phased out, long-term support for infrastructure development and technological innovation remains critical. Localized policies, such as exemptions from purchase restrictions and traffic regulations, have further stimulated market demand.

In the future, the growth of NEV market will increasingly depend on sustained technological progress and the refinement of policy frameworks. Technologically, the focus will shift towards enhancing the intelligence and networking of NEVs, especially with the broader implementation of advanced autonomous driving technologies. Future policies will likely prioritize infrastructure investment, environmental regulations, and innovation incentives. Long-term policies are expected to center on sustained incentive mechanisms and further enhance consumers' perceived value by continually improving infrastructure.

While technological advancements have enhanced the performance and user experience of NEVs, the extent of their impact on perceived value still warrants further research. A key challenge for the industry is determining how to increase consumer perceived value through future technological improvements. Policy incentives have been instrumental in driving NEV adoption, but it is uncertain whether they will continue to affect consumer purchase intentions by enhancing perceived value. This is especially relevant as vehicle purchase subsidies are gradually being phased out, necessitating further optimization of the long-term effectiveness of these policies. This study explores how technical characteristics and policy incentives influence consumers' intention to purchase involves examining the roles of perceived value. The research results aim to broaden the theoretical basis of consumers' purchase intention and further understand the mechanism by which technical characteristics and policy incentives affect purchase intention.

Research objective

This research investigates the impact of the technical characteristics of new energy vehicles and the role of policy incentives on consumers' intent to purchase. The goals of this research include:

(1) Reveal the role of new energy vehicle technical characteristics such as intelligence, networking, and safety in promoting purchase intention, with consumer perceived value as the intermediary.

(2) Reveal the role of policy incentives such as publicity and promotion, subsidies and non-subsidies in promoting purchase intention, with consumers' perceived value as the mediator.

The goals are to provide theoretical insights and practical guidance for governments, businesses, and relevant stakeholders to advance the adoption of new energy vehicles and promote the development of green transportation.

LITERATURE REVIEW

Technical Characteristics

Technical characteristics are intrinsic properties of products, which refer to the technical properties and performance indicators of products during their development and use (Ulrich, Karl T. & Eppinger, Steven D., 2016). These characteristics include specific parameters and indicators of physical, chemical, functional, mechanical, electrical and other aspects of the product, and are usually used to describe the technical specifications, quality level and performance of the product. Product technical characteristics play a vital role in the process of product design, development, manufacturing and marketing, and can help companies ensure that their products meet user needs and technical requirements.

The "New Four Modernizations", symbolizing the future trajectory of the global automotive industry, has emerged as a focal point of activity. This concept reflects the aspirations of most automotive companies regarding the industry's future development. The "New Four Modernizations" can be simply summarized as "electrification, networking, intelligence, and sharing" (Zhao Congzhu, 2023). The market demand for new energy vehicles has gradually shifted from functional products to intelligent products. Accelerating the integration of energy, information, transportation and other technologies, and exploring emerging technologies such as unmanned driving and intelligent networking are the breakthroughs for countries to seize the initiative in the new energy vehicle industry (Xiao Xu & Qi Yudong, 2024).

Zhou Yuping (2024) divides the technical characteristics of new energy vehicles into electrification functional attributes (range, charging efficiency) and intelligent functional attributes (autonomous driving, vehicle networking). Gong Qiang (2023) divides the technical characteristics of new energy vehicles into several dimensions: overall service quality of the product, product safety, durability and reliability, and product appearance design. Li Danqing & Guo Yan (2022) pointed out that the technical factors that affect consumers' decision to buy new energy vehicles include safety, convenience of charging or refueling, intelligence and networking. Xia Chen (2022) pointed out that the technical characteristics of independent high-end brand new energy vehicles include product appearance, innovative technology, safety and comfort, and driving range. Zhang Guofang et al. (2023) divided the technical characteristics of new energy vehicles into three dimensions: intelligence, networking, and safety. It can be seen that the common dimensions of new energy vehicle technical characteristics include charging, driving range, safety, intelligence, and networking. Due to the rapid development of technology, mid-to-high-end new energy vehicles pay more attention to intelligence and networking, so this study selected the three dimensions of intelligence, networking, and safety.

Policy Incentives

Policy incentives are essential for promoting the commercialization of demand in the new energy vehicle market. Wu et al. (2023) noted that consumers are particularly attentive to policies such as purchase subsidies, exemptions from vehicle purchase taxes, unrestricted driving, and favorable car-buying incentives. Meanwhile, Lou et al. (2017) found that consumers generally lack awareness of relevant policies, often relying on media sources for information. Among these, "subsidies" and "tax reductions" are particularly popular, while other policies vary in consumer preference. Additionally, Chen et al. (2019) discovered that the establishment of infrastructure, such as charging stations, along with incentive policies guiding the use of new energy vehicles, can significantly stimulate consumer purchasing behavior.

The Chinese government has implemented various policies to promote the growth of new energy vehicles. Publicity policy encompasses the measures aimed at informing consumers about new energy vehicles before their purchase, forming the initial link in how consumption promotion policies influence potential buyers (Li Chuang et al., 2021). Fiscal subsidy policies primarily aim to offer monetary support to consumers in the new energy vehicle market. By implementing purchase subsidies and tax exemptions, these policies effectively lower the actual purchase costs and ongoing usage expenses of electric vehicles. This reduction helps to narrow the price gap between electric vehicles and traditional fuel-powered vehicles, thereby enhancing the competitiveness of electric vehicles in the market. Irani & Chalak(2015) highlighted that fiscal policy plays a crucial role in stimulating purchase incentives, with government subsidies significantly influencing public preference for new energy vehicles. Non-financial incentives include a series of supporting policies such as improving consumers' environmental awareness, improving the measure system, and accelerating the construction of charging infrastructure. Yang et al. (2019) further emphasized that these non-financial policies have proven effective in promoting electric vehicle adoption.

Y. Jiang et al. (2023) divided new energy vehicle policies into two dimensions: subsidy-based and non-subsidized. According to W. Li et al. (2016), policies associated with new energy vehicles can be categorized into seven distinct dimensions: macro-level considerations, demonstration projects, subsidies, tax incentives, technical support, industry management, and infrastructure development. L. Zhang & Qin (2018) divided new energy vehicle policy tools into three types: supply side, demand side and environment side. Peng & Li (2022) divided China's new energy vehicle policy into four dimensions: promotion strategy, technology strategy, fiscal subsidy strategy and infrastructure strategy. Xian et al. (2022) divided new energy vehicle policy into four dimensions: total purchase subsidy, exemption from purchase tax, traffic restriction, and license plate mode (including lottery, auction, queuing, etc.). It can be seen that the common dimensions of new energy vehicle policy incentives include fiscal subsidy policies, non-fiscal subsidy policies, publicity policies, infrastructure policies, and road rights policies. In fact, infrastructure policies and road rights policies are also non-subsidy

policies, so this study selects three dimensions: publicity policies, subsidy policies, and non-subsidy policies.

Perceived value

Consumer behavior theory posits that perceived value plays a pivotal and immediate role in influencing consumer actions. Earlier research on perceived value was conducted by Zeithaml (1988), who characterized it as a holistic assessment of a product. This evaluation takes into account the balance between the costs incurred by consumers when purchasing the product and the value they perceive to gain from it.

For automobile products, superior power systems and operating performance will give consumers a higher perceived value, thus affecting their willingness to buy (Wang Zongshui et al., 2016). Parasuraman & Grewal (2000) highlighted that price perception is a crucial factor among the drivers of perceived value, significantly influencing customer satisfaction and indirectly impacting perceptions of price fairness. Quality value, on the other hand, pertains to the satisfaction consumers derive from purchasing new energy vehicles that exceed their quality expectations (Parasuraman & Grewal, 2000). Price factors and quality value are perceived value dimensions analyzed and summarized from a practical perspective, while emotional value and brand value will also affect consumers' purchasing decisions from a hedonic perspective (Sweeney & Soutar, 2001). Emotional value is characterized by the pleasure and pride that consumers experience when using new energy vehicles. In contrast to conventional automobiles, these vehicles are considered eco-friendly products that receive active promotion from government entities. Consumers may opt for green consumption to showcase their status and personal growth, project the image of "environmental heroes," and earn public recognition and admiration (Guo Xiaolin & Lin Derong, 2015). Brand value is derived from the level of customer preference for a brand, reflecting the utility gained when the symbolic significance of the brand exceeds expectations. For instance, both Tesla and the Toyota Prius are associated with an environmentally friendly and advanced technological brand image, providing consumers with a brand value that surpasses their initial expectations. In this study, three dimensions namely price value, quality value, and emotional value have been selected for analysis.

Purchase Intention

Originally rooted in psychological research, the concept of purchase intention has evolved to describe the psychological inclination of consumers to engage in specific purchasing behaviors voluntarily. Researchers have integrated this fundamental concept of buyer intention into the field of consumer behavior studies.

Research conducted by Mullet & Karson (1985) described purchase intention as a consumer's attitude toward the decision to buy a particular product. This attitude formation process involves the alignment of external product information with internal self-perception. Several scholars assert that purchase intention constitutes a critical link in the consumer

purchasing process. Research by Ajzen & Driver (1991) indicated that consumer purchasing behavior unfolds in distinct stages, with purchase intention representing a vital phase that must be navigated. This intention serves a fundamental role in the overall purchasing process, making it a key indicator for predicting subsequent consumer behavior. Several scholars contend that purchase intention reflects consumers' attitudes toward specific products or services, as well as the likelihood of acquiring them. Research by Dodds et al. (1991) elaborated that consumer purchase intention encompassed both the attitude towards particular products and services and the potential for purchasing these items. In this context, purchase intention effectively signified the subjective inclination of consumers regarding their purchasing decisions, exhibiting a degree of subjectivity that influences future buying behaviors.

Purchase intention is a mature concept, and common dimensions include purchase possibility, purchase frequency, and recommendation intention. Therefore, the dependent variable purchase intention of this study is measured by these three dimensions.

Technical Characteristics, Perceived Value and Purchase Intention

J. Yin & Qiu (2021) explored the relationship between artificial intelligence (AI) technology and online purchase intentions using the "SOR" model. Their research revealed that factors such as the accuracy, insights, and interactive experiences provided by AI marketing technology significantly enhance consumers' perceived value. This perceived value, in turn, facilitates the development of consumers' purchase intentions, serving as a mediating factor between AI technology and online purchase intentions.

Ko et al. (2011) investigated the interplay among product attributes, perceived value, and repurchase intentions, discovering that perceived value serves as a mediating factor between product attributes and purchase intentions. Their findings indicate that consumers in South Korea, the United States, and France exhibit variations in how a product's intrinsic and extrinsic attributes relate to perceived value and repurchase intentions.

Mao Yiran (2024) examined the impact of intelligent characteristics of AI products on consumers' willingness to purchase, utilizing perceived value as a mediating variable through the lens of technology empowerment. The study revealed that perceived value partially mediates the relationship between the intelligent attributes of AI products and consumers' purchasing intentions.

It can be seen that there are few studies on the relationship between technical characteristics, perceived value and purchase intention. In particular, there is a lack of research on the mediating role of perceived value between technical characteristics and purchase intention in the field of new energy vehicle consumption.

Policy Incentives, Perceived Value and Purchase Intention

Consumption incentives serve as effective tools that directly influence consumer purchasing intentions. Cai Jianhu et al. (2022) explored the connection between government incentive policies and the intention to purchase pure electric vehicles. They concluded that such

policies significantly influence consumer car purchasing intentions through their effects on perceived price and welfare value. Specifically, consumption subsidies bolster consumers' inclination to buy vehicles by improving their perception of price value, while infrastructure development enhances their willingness to purchase by boosting perceived welfare value. Additionally, tax policies impact consumers' vehicle purchasing intentions by affecting both perceived price and welfare values, with a particularly strong influence on welfare perception.

Zhang Danhua (2024) examined how policies related to the use of new energy vehicles influence consumer purchasing intentions. Drawing from previous studies and official government documents, he categorized these policies into two types: privileges, which include priority rights, and preferences, referring to preferential policies. The findings showed that perceived value mediated the relationship between priority rights and consumer purchasing intentions, as well as between preferential policies and purchasing intentions.

Wang Minghao & Xiong Bingcheng (2023) investigated the effects of Jilin Province's new energy vehicle consumption promotion policies on the purchasing intentions of potential consumers. The study revealed that perceived value acts as a mediator between both subsidy and non-subsidy policies and the purchasing intentions of potential consumers.

There are many studies on the relationship between policy incentives, perceived value and purchase intention. However, in the field of new energy vehicle consumption, there are fewer studies on the mediating role of perceived value between policy incentives and purchase intention.

Development of Hypothesis

The independent variables evaluate the technical characteristics of new energy vehicles, including three dimensions: intelligence, networking, and security. The independent variables evaluate the policies of new energy vehicles, including three dimensions: publicity policies, subsidy policies, and non-subsidy policies. The mediating variables measure consumers' perception of the value of cars, including three dimensions: price factors, quality value, and emotional value. The dependent variables evaluate consumers' purchase intention, including three dimensions: purchase possibility, purchase frequency, and willingness to recommend. The hypotheses are as follows:

Hypothesis 1: Technical characteristics have a positive impact on perceived value.

Hypothesis 2: Perceived value has a positive impact on consumers' purchase intention.

Hypothesis 3: Perceived value mediates the relationship between technical characteristics and purchase intention.

Hypothesis 4: Policy incentives have a positive impact on perceived value.

Hypothesis 5: Perceived value mediates the relationship between policy incentives and purchase intention.

The research framework is shown in the Figure 1.

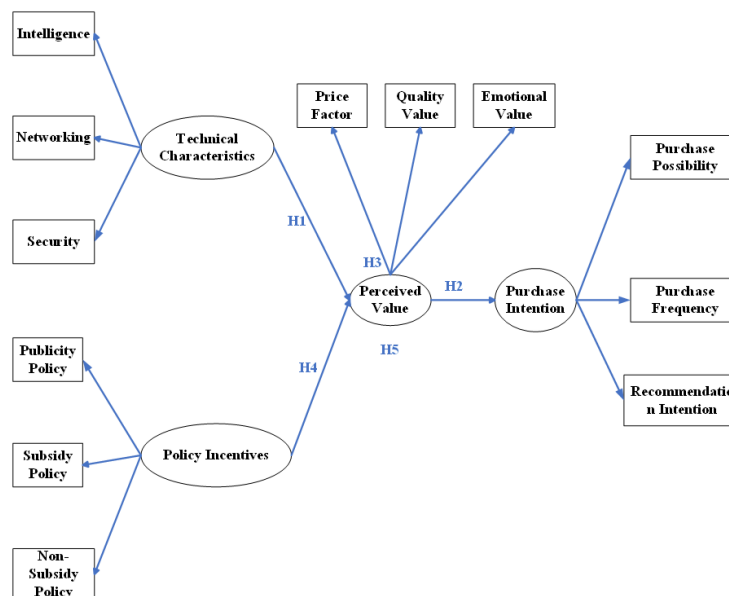


Figure 1. The Research Framework

METHODOLOGY

This study employs a sequential mixed methods design, where one type of data informs the subsequent collection of another type (Tashakkori & Teddlie, 2010). The research adopts a "quantitative-qualitative" model, beginning with the collection and analysis of quantitative survey data, followed by the gathering and examination of qualitative data.

The quantitative research uses a questionnaire to survey new energy vehicle consumers and potential consumers aged 18-60 in Guangxi, and reveals the relationship between the four latent variables through the structural equation model.

The qualitative research specifically utilizes semi-structured interviews to gain an in-depth understanding of a select group of consumers' subjective perceptions regarding how technical characteristics and policy incentives influence their intention to purchase new energy vehicles (NEVs), as well as their perceptions of value and risk.

CONCLUSION AND FUTURE WORK

This study has developed a model that links technical characteristics, policy incentives, perceived value, and purchase intention, providing a theoretical foundation for better understanding the key elements that influence consumers' decisions to purchase new energy vehicles (NEVs). The study initially identifies the mediating role that perceived value plays between technical characteristics and purchase intention, offering practical insights for NEV development and promotion. By improving the technical characteristics of products, perceived value is enhanced, which subsequently elevates consumers' intention to purchase. Furthermore, the mediating influence of policy incentives offers useful guidance for governments seeking to advance the commercialization of NEVs. It shows that, through the application of effective

policy measures, perceived value can be increased, ultimately boosting purchase intentions. Additionally, this study broadens the comprehension of the critical function that perceived value serves in consumer decision-making, extending its relevance to the NEV sector. Future studies may investigate other variables that affect purchase intention, such as perceived risk, brand loyalty, and social identity, to further refine the model. In addition, future research could apply longitudinal designs to examine the evolving effects of policy incentives and technical attributes on purchase intention over time, aiding policymakers in crafting more timely and effective incentives.

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