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## USING THE FSQCA METHOD TO INVESTIGATE CONSUMER'S NEW ENERGY VEHICLE CONSUMPTION IN AN URBAN-RURAL DIFFERENCES CONTEXT

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### Abstract

Climate change poses a common challenge to humanity, and fostering a green and low-carbon transformation in both production and lifestyles is imperative for achieving sustainable development. Grounded in the theory of consumption and goal-framing theory, and further integrates product involvement and urban-rural differences, this study establishes a research framework to better elucidate consumers' purchase intention toward new energy vehicle. Employing fuzzy-set qualitative comparative analysis (fsQCA), this study identified four distinct yet equally effective configurations that lead to high purchase intention. Configuration 1 represents an urban-rural generalized consumption pattern applicable to both urban and rural consumers, highlighting shared motivational characteristics. Configuration 2 depicts an egoism-oriented paradigm specific to certain urban subgroups. Configurations 3 and 4 constitute the rural consumption paradigms, they share the same core conditions. Specifically, Configuration 4 aligns with "rational and eco-friendly" consumers in rural. Consequently, segment market and segmentation criteria were determined. This study theoretically contributes to the literature by identifying multiple equifinal paths and their applicable groups through configurational insights. Finally, some recommendations were proposed.

**Keywords:** New energy vehicle, purchase intention, fsQCA, urban-rural differences

### Introduction

Greenhouse gas emissions from human activities are one of the main causes of global warming (Isbanner et al., 2025), causing massive ecological disasters and irreparable damage to the environment while also impacting human health and sustainable development. In response to the serious challenges of climate change, governments and international organizations have successively introduced carbon emission control plans. For instance, the Chinese government has set "dual carbon" goals, committing to peaking carbon emissions before 2030 and achieving carbon neutrality before 2060 (Ma et al., 2025). The transportation sector contributes about 24 percent of global energy-related carbon dioxide emissions, with fuel vehicles being major emitters. The green and low-carbon transformation of the transportation sector is an inevitable trend. To achieve the "dual carbon" goal on schedule, especially the popularization of new energy vehicle (NEV) has become one of the effective measures. In 2024, sales of NEVs in China reached 12.866 million, accounting for 40.9% (China Association of Automobile Manufacturers, 2025), still lower than traditional fuel



vehicles, indicating that the market penetration of NEVs faces many challenges.

To address the knowledge gaps, this study will integrate the theory of consumption value and goal-framing theory, leveraging functional value, emotional value, social value, conditional value and epistemic value to reflect consumers' egoistic appeals in NEV consumption, and introducing the normative goal frames to measure consumers' altruistic appeals, thereby constructing a framework that takes into account consumers' dual appeals to better predict and explain NEV consumption.

To expand the user scale, the NEV sector must adhere to the general law of new product diffusion, placing equal emphasis on both urban and rural markets, and continually investigate the factors and mechanisms that drive consumer adoption. However, supporting infrastructure for NEVs in rural areas remains scarce compared to urban settings (Feng et al., 2025). Effective policy support is therefore crucial to facilitate NEV deployment in rural regions and broaden market reach (Fang, 2022). Furthermore, since product involvement has been established in prior studies as a significant predictor of purchase intention (Mou et al., 2020), this study incorporates product involvement and urban–rural differences as two key conditions.

In terms of methodology, this research employs fuzzy-set qualitative comparative Analysis (fsQCA) rather than regression analysis to identify the multiple configurations that lead to high purchase intention for NEVs and to uncover interaction among all conditions.

### **Research Objectives**

The purposes of this study are as follow:

- (1) Grounded in a comprehensive literature review and theoretical models, the conceptual framework was created.
- (2) Explore multiple equivalent configurations that lead to high NEV purchase intention.
- (3) Determine segment market and actionable segmentation criteria for the NEV market from the configurational findings.

### **Research Scope**

This study falls within the range of consumer behavior, it takes NEV consumers as the research object. Based on the theory of consumption value and goal-framing theory, the fsQCA method is used to obtain an overall solution for expanding the NEVs consumption.

## Research Framework

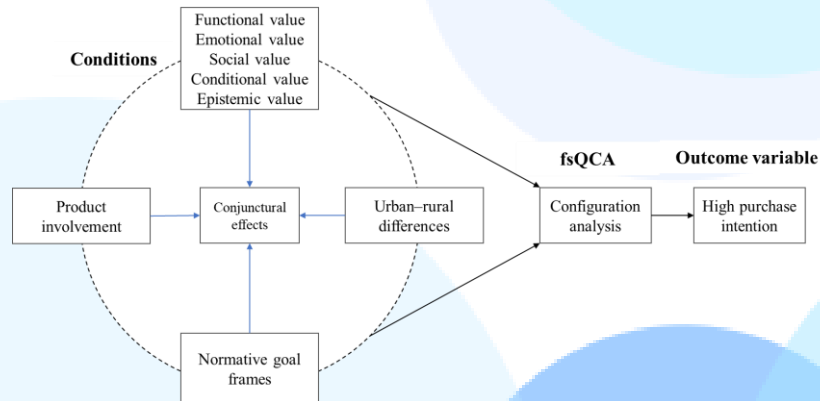


Figure 1 Research Conceptual Framework

Due to the fsQCA method focuses on uncovering interactions among conditions leading to a specific outcome and advocates a configurational perspective for understanding complex causal mechanisms, it can precisely identify multiple equifinal pathways that produce high purchase intention, along with the cases each configuration covers. Based on these arguments, this study selects functional value, emotional value, social value, conditional value, epistemic value, normative goals, product involvement, and urban-rural differences as the antecedent conditions, and purchase intention was taken as outcome variable, see Figure 1.

## Literature Review

The disconnection between egoistic appeals and altruistic appeals can lead to green attitude-behavior gap (Lindenberg & Steg., 2007). Some theoretical models emphasize altruistic appeals in pro-environmental behaviors (Schwartz, 1977), while ignore the individual's egoistic appeals, resulting in token environmental behaviors and giving rise to "greenwashing" (Zioło et al., 2024), and making green consumption unsustainable. Instead, some theoretical models explain the internal motivation of consumers' participation in green consumption from the perspective of egoism (Sheth et al., 1991), simplifying its environmental behavior and causing green consumption to fall into "utilitarianism" and become a tool for pursuing personal interests, resulting in the opposition between "instrumental rationality" and "value rationality" in green consumption.

The goal-framing theory effectively balances the egoistic and altruistic appeals (Isbanner et al., 2025), categorizing a series of sub-goals into utilitarian, hedonic, and normative goal frames (Onwezen, 2023). However, utilitarian and hedonic goals simplify the composition of individuals' self-interest, leading to cognitive ambiguity and limiting the applicable value of research findings. To this end, this study integrates the theory of consumption value and goal-framing theory (Lindenberg & Steg, 2007). Relying on functional value, emotional value, social value, conditional value, and epistemic value to reflect consumers' egoistic appeals in NEV consumption, and introduce the normative goal frames to reflect consumers' altruistic appeals. The integrated framework that balances consumers' dual appeals and better predicts

and explains NEV consumption.

Some scholars argued that purchase NEVs was a complex activities that requires cognitive involvement, emotional involvement and behavioral involvement to achieve the expected rationality (e.g., Mou et al., 2020). Cue utilization theory suggests that consumers rely on adequate consumption information as cues to determine the product quality so as to make a better purchase decision. So, product involvement is introduced as a condition in this study.

Moreover, urban-rural differences are a common problem in global development, presenting a clear binary pattern. Differences in economics, education, culture, customs, and infrastructure create two distinct consumer scenarios and decision-making patterns (Cobbinah et al., 2024; Zhang & Qin, 2018). Thus, there may be significant urban-rural differences in consumer purchase intentions toward NEVs. This study will explore multiple equivalent pathways driving consumer's NEV purchase intention in the context of urban-rural differences.

## Methodology

### Data collection and sampling data

A questionnaire survey was randomly conducted with Chinese consumers as the sample frame. A total of 684 samples were retrieved. A total of 175 invalid samples and 509 valid samples were identified, with an effective rate of 74.42%.

### Measures

The scales of consumption value, functional value, emotional value, conditional value and epistemic value each contain 3 items, while social value contains 4 items, Cronbach's alpha=0.763, 0.753, 0.866, 0.728, 0.757. Normative goal consists of 4 items, Cronbach's alpha=0.758. Product involvement includes five items, Cronbach's alpha=0.832. The purchase intention for new energy vehicles includes three items, Cronbach's alpha=0.740. All items used a 7-point Likert scale (1 = strongly disagree, 7 = strongly agree).

### Data analysis and results

#### Conditions selection and calibration

This study takes the mean score of eight latent variables that are listed in Figure 1. Following Ragin (2008) and Fiss's (2011) suggestions, we calibrate the original data to 5% (fully out), 50% (crossover point), and 95% (fully in) criteria. Due to urban-rural differences was classified variables, we calibrated for rural region to 0 and for urban region to 1.

#### Necessity analysis of single condition

Before conducting the configuration analysis, potential necessary conditions were investigated. Following the recommendations of Ragin (2008), a consistency coefficient of 0.9 is used as the criterion for determining the presence of a necessary condition when coverage is sufficient. A necessity analysis using *fsQCA* 3.0 revealed that the consistency coefficients for the conditions leading to high and low NEV purchase intention did not exceed 0.9, indicating that the single condition is not an absolute prerequisite for high or low purchase intention.

Table 1 Configurations for high NEV purchase intention (N = 509)

Conditions	High new energy vehicle purchasing intention			
	Configuration 1	Configuration 2	Configuration 3	Configuration 4
Functional value	●	●	●	⊗
Emotional value		●	⊗	●
Social value	●	●	⊗	⊗
Conditional value	●	●	●	●
Epistemic value	●	●	●	⊗
Normative goals	●		⊗	●
Product involvement	●	●	●	●
Urban-rural difference		●	⊗	⊗
Consistency	0.923	0.921	0.963	0.971
Raw coverage	0.544	0.279	0.139	0.132
Unique coverage	0.145	0.017	0.016	0.017
Solution consistency			0.917	
Solution coverage			0.596	

Notes: Consistency = (Cases in configuration with outcome) / (Total cases in configuration), Raw coverage = (Cases in configuration with outcome) / (All cases with outcome), Unique coverage = (Solely covered cases with outcome) / (All cases with outcome), Solution consistency = (Cases in all configurations with outcome) / (Total cases in all configurations), Solution coverage = (Cases in all configurations with outcome) / (All cases with outcome).

#### Configuration analysis

Conduct configuration analysis to determine multiple equivalent paths that drive the high NEV purchase intention. First, according to the recommendations of Fiss (2011) and Greckhamer et al. (2018), set the original consistency threshold to 0.85 in *fsQCA3.0*. The PRI (Proportional reduction in inconsistency) consistency threshold is set at 0.7. Given that 509 large samples are used, set the case frequency to 3. Taking the high NEV purchase intention as the outcome variable, the complex solutions, parsimonious solutions and intermediate solution were obtained. Following the rules, this study matched and compared the intermediate solutions and the parsimonious solutions to determine whether the conditions belong to the core condition or the peripheral condition, core condition that exists both in intermediate and parsimonious solutions, denoted by ● If one condition exists only in the intermediate solution, it is a peripheral condition, and denoted by ●. Meanwhile, ⊗ indicate the absence of core condition and, ⊗ means peripheral condition. The results are summarized in Table 1.



#### Robustness test

The raw consistency threshold in fsQCA 3.0 was raised from 0.85 to 0.90, while other parameters remained unchanged. The general pattern remained consistent with the baseline results in Table 1, indicating that the identified configurations are robust.

#### Conclusion and Discussion

There are multiple solutions to driving high purchase intentions among urban and rural consumers. Configuration analysis determines the general and specific configurations that leads to high purchase intention in urban and rural regions.

**Configuration 1: Urban–rural generalized consumption pattern.** Configuration 1 represents a generalizable consumption model across both urban and rural contexts, revealing shared behavioral mechanisms among NEV consumers. Functional value, conditional value, epistemic value, normative goals, and product involvement serve as core conditions, while social value acts as a peripheral condition. When these factors operate synergistically, they effectively drive high purchase intention. For both urban and rural consumers, balancing egoistic and altruistic appeals, supplemented by social self-image enhancement, can sustainably and robustly promote NEV adoption. The joint presence of functional, conditional, epistemic, normative, and social values highlights consumers' emphasis on product usefulness and social significance, forming a key pathway toward strong purchase intention.

**Configuration 2: Urban egoism-oriented consumption paradigm.** Configuration 2 mainly applies to urban egoistic consumers. Here, functional value, social value, conditional value, epistemic value, and product involvement are core conditions, while emotional value acts as an auxiliary factor. This pattern suggests that meeting consumers' gain and hedonic goal frames is essential to promoting NEV consumption. Neglecting egoistic appeals could lead to moral overemphasis. Thus, while advocating environmental awareness, policymakers should adopt inclusive strategies that address diverse motivational needs across consumer segments.

**Configurations 3 and 4: Rural NEV consumption paradigms.** Configurations 3 and 4 together form a second-order equivalence configuration, sharing identical core conditions but differing in peripheral ones. Configuration 3 (i.e. Utilitarian-oriented rural consumers) applies to consumers motivated primarily by practical gains. Its core conditions include high conditional value, high product involvement, non-high social value, and rural context (non-urban), supplemented by high functional value, high epistemic value, non-high emotional value, and non-high normative goals. Given infrastructural limitations and income constraints, conditional value (policy incentives and convenience) is particularly salient to rural consumers. They pay less attention to social image but are sensitive to instrumental utility. Enhancing convenience and policy support, coupled with value alignment and involvement, can effectively stimulate high purchase intention among this group.

Configuration 4 (Rational-environmental rural consumers) characterizes another subset of rural consumers who emphasize high conditional value, high product involvement, non-high social value, and rural context, supplemented by non-high functional value, high emotional value, non-high epistemic value, and high normative goals. These "rational environmentalists" attach great importance to conditional value, recognize the importance of NEVs, focus less on



environmental self-image as well as the motivation to try new things, but possess a basic environmental awareness, and accept the new ecological life paradigm. Configuration 3 and Configuration 4 suggest that the NEV consumption market in rural region needs to be further deeply segmented in order to improve product-demand fit.

The four configurations highlight product involvement as the core condition for high purchase intention, underscoring the need for continuous innovation that delivers excellent utilitarian, hedonic (Khan et al., 2023), and environmental value (Biswas & Roy, 2015) to attract greater attention and consumption investment from both urban and rural consumers.

Based on the fsQCA results, this study identifies both generalized pathways that drive high purchase intention for NEVs and specific pathways applicable to particular subgroups, thereby offering multiple strategies for expanding NEV consumption. Urban and rural consumer markets are not entirely segregated; a considerable number of consumers share common needs. This observation is further supported by the insignificant moderating effect of urban–rural differences across most mediation paths. The findings can be partly explained by Fang (2022), who notes that continued progress in new urbanization and rural revitalization strategies has advanced urban–rural integration, thereby narrowing part of the consumption gap between these areas. At the same time, in line with studies by Cobbinah et al. (2024), Li et al. (2022), and Welsch et al. (2021), the four configurations confirm that heterogeneity in consumption needs between urban and rural consumers remains widespread. The most notable distinction lies in the emphasis placed on social values, reflecting fundamental differences in the need hierarchies of the two consumer groups. Therefore, developing market segmentation strategies based on this criterion is essential.

Traditional regression analysis emphasizes the net effects of individual variables on the dependent variable while controlling for others (e.g., Biswas & Roy, 2015), but it cannot capture the interactive and configurational effects among multiple antecedents, nor can it identify the specific consumer segments covered by each equifinal path (Greckhamer et al., 2018). The fsQCA approach expands our understanding of the conjunctural effects of conditions regarding NEV consumption, thus extending the current studies such as Isbanner et al (2025) and Khan et al. (2023).

Taken together, this study makes theoretical contributions through a configurational perspective by revealing the diversity of egoistic appeals and underscoring the importance of user segmentation. It also emphasizes the need to balance the dual appeals as addressed in goal-framing theory. These findings provide quantitative evidence for optimizing STP strategies in NEV consumption.

### Research Suggestions

The exploration of four configurations that drive high NEV purchase intention enables us to propose targeted policy recommendations, as detailed below.

First, the findings confirmed that there is no single optimal solution covering all consumers in the new energy vehicle consumption, although consumers with both egoistic and altruistic appeals are dominant (Configuration 1 & Configuration 4), consumers driven by consumption value and environmental responsibility still maintain a significant presence.



Therefore, companies need to adapt a flexible and diverse marketing portfolio to meet the needs of subgroups regarding NEV.

Second, optimize the product portfolio by developing diverse products with distinct value propositions within the new energy framework, targeting diverse consumer groups and highlighting product strengths. Meanwhile, rural consumers can be further segmented into “utilitarian” and “hedonic” subgroups; this segmentation allows for innovating in product design, positioning, and brand identity to address each segment’s unique needs concerning emotional value, epistemic value, and normative goals.

Third, design an integrated communication strategy that balances the delivery of diverse consumption value and environmental responsibilities, addressing diverse consumer concerns. Furthermore, collaborate with social managers to explore the implementation of a “personal carbon credits” system, attempting to link it directly to NEV usage discounts (such as charging discounts, free parking vouchers), integrating consumers’ utilitarian, pleasure and normative goals to achieve sustainable development of the NEV consumption market.

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