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Segmenting the Chinese New Energy Compact SUV Market: A Latent Class Analysis of Consumer Preferences

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Abstract: The burgeoning new energy vehicle (NEV) sector in China, particularly the compact SUV market, presents a dynamic landscape for consumer preferences and behaviors. This study employs a latent class analysis (LCA) to segment the Chinese new energy compact SUV market, aiming to identify distinct consumer groups with homogeneous preferences and behaviors. Utilizing a comprehensive dataset of 6,720 consumer samples sourced from a reliable automotive statistics website, the study delineates two primary consumer segments: "Luxury Brand Preference Buyers" and "Normal Brand Rejection Buyers." The findings reveal that the former segment exhibits a marked preference for luxury brands, and tends to make fewer purchases, predominantly in the last quarter of the year 2023. In contrast, the latter segment shows a strong preference for another luxury brand and a balanced distribution of purchase quantities throughout the year, with a clear rejection of normal brands. These insights are instrumental for NEV enterprises to develop targeted marketing strategies that cater to the specific needs and preferences of these consumer segments, thereby enhancing market share, consumer satisfaction, and loyalty.

Keywords: New Energy Vehicles (NEVs), Consumer Preferences, Latent Class Analysis, Marketing Strategies

1. Introduction

The rise of new energy vehicles (NEVs) has ushered in a new era for the automotive industry, with China at the forefront of this transformation. The compact SUV segment, known for its blend of affordability, functionality, and environmental sustainability, has become a significant battleground for consumer preferences and market share. Despite the government's robust support and the vast potential of the NEV market, consumer uptake has been relatively slow, indicating the need for a deeper exploration into the determinants of consumer decisions. Understanding the intricate dynamics of consumer behavior within this segment is imperative for enterprises to apply effective marketing strategies and meet the evolving demands of the market. A significant research gap exists in comprehending the specific characteristics and preferences of Chinese NEV consumers, particularly within the compact SUV segment. This gap is critical, as consumer preferences and behaviors can vary significantly across different vehicle segments. To address this research gap, this study leverages latent class analysis (LCA), a powerful tool for identifying distinct consumer segments with homogeneous preferences and behaviors. By analyzing a rich dataset of consumer data, the study aims to classify consumers of new energy compact SUVs and apply more targeted marketing

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strategies for different types of consumers. The findings of this study are expected to be beneficial not only for enterprises to better meet market demand but also for providing reference for the formulation of marketing strategies to enhance user satisfaction and loyalty.

2. Literature Review

The burgeoning market for New Energy Vehicles (NEVs) in China presents a significant area of interest for researchers and industry professionals alike. With China being the largest NEV market globally, understanding consumer behavior within this domain is crucial for the sustainable growth of the industry [1-3]. Despite the vast potential and government support for NEVs, consumer uptake has been slow, indicating a need for deeper investigation into the factors influencing consumer decisions [4]. A notable research gap exists in understanding the specific characteristics of Chinese NEV consumers, particularly within the Compact SUV segment. This gap is significant, as consumer preferences and behaviors can vary greatly across different vehicle segments [5]. The Compact SUV market, with its unique blend of affordability, functionality, and environmental sustainability, requires tailored analysis to uncover the nuances of consumer engagement. Rao Liang suggests that issues such as high prices and the inconvenience of energy replenishment are restricting the marketing and promotion of new energy vehicles [6]. He proposes the need to innovate the concept of new energy vehicle marketing, expand its marketing channels, and enrich its marketing methods to design a feasible path for the promotion of new energy vehicles. However, current research has not yet explored how marketing strategies should serve customers from their perspective.

Segmentation of the Chinese NEV market based on consumer behavior is one of pivotal approach to addressing this research gap. By employing LCA, researchers can identify distinct consumer segments with homogeneous preferences and behaviors, enabling a more targeted and effective marketing strategy [7]. This approach can provide insights into how different consumer groups perceive the value and risk associated with NEVs, which is essential for enhancing market share and consumer satisfaction [5]. In conclusion, segmenting the Chinese New Energy Compact SUV market through a consumer behavior-centric approach is essential for uncovering consumer preferences and behaviors [7]. This will enable NEV enterprises to develop more effective strategies to meet the diverse needs of their consumer base.

3. Research Method

3.1. Participants

The present study has got an extensive dataset comprising 6,720 samples of consumer data focused on the new energy compact SUV market in China. This public collection of data points has been meticulously sourced from the website 'http://www.auto-stats.org.cn/default.asp', which is a trusted source for automotive statistics. The data encapsulates a comprehensive snapshot of consumer preferences, behaviors, and trends within the new energy vehicle segment for the year 2023.

3.2. Measurement

Purchase Quantity is categorized into three distinct groups: low, moderate, and high. The first group represents consumers who have made purchases in quantities ranging from one to four units. The second group encompasses purchases of five to nine units, while the third group includes purchases of ten units or more. Product type is categorized into six distinct groups. The initial three categories correspond to luxury brands, specifically labeled as luxury brand 1, luxury brand 2, and luxury brand 3. The subsequent three categories pertain to normal brands, denoted as normal brand 4, normal brand 5, and normal brand 6. Purchase quarter is divided into four groups. Each group represents the quarter

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in which consumers have executed their purchasing behavior, corresponding to the first, second, third, and fourth quarters of the year, respectively.

3.3. Analysis Strategy

Using latent class analysis models, data is processed and analyzed through SPSS27.0 and Mplus 8.8 to identify different consumer groups [8].

4. Result

4.1. Descriptive Statistics

Table 1 presents the results of a descriptive statistics analysis for the dataset, which includes a total of 6,720 observations (N = 6720). The analysis focuses on three key variables: Purchase Quantity, Product Type, and Purchase Quarter, each categorized into distinct groups. The distribution of the data of purchase quantity reveals that the majority of consumers (96.3%, or 6,468 observations) fall into the "Low" category. This indicates that the majority of the sample is likely to be purchasing in smaller quantities. The "Moderate" category, which includes 2.7% of the observations, and the "High" category, accounting for 1.1%, are less common. This suggests that a significant portion of the sample is characterized by their lower purchase volumes. The data of product type shows that the "Luxury brand 1" is the most prevalent, accounting for 30.7% of the sample. The "Normal brand 4" is the most common among the normal brands, making up 20.0% of the observations. This suggests that while luxury brands are preferred, there is also a substantial market for normal brands. The data of purchase quarter indicates that the "Quarter 2" is the most popular period for purchases, with 22.9% of the observations. This could imply that the second quarter is a particularly busy period for the market. The "Quarter 3" follows closely with 26.3%, suggesting that it is also a significant period for consumer activity. The "Quarter 1" and "Quarter 4" each account for 17.9% and 32.8% of the purchases, respectively, indicating that the beginning and end of the year are also periods of high consumer activity.

Table 1: Results of descriptive statistics (N = 6720).

Variable	Category	Fluency	Percentage (%)
Purchase Quantity	Low	6468	96.3
	Moderate	180	2.7
	High	172	1.1
Product type	Luxury brand 1	2066	30.7
	Luxury brand 2	502	7.5
	Luxury brand 3	924	13.8
	Normal brand 4	1341	20.0
	Normal brand 5	739	11.0
	Normal brand 6	1148	17.1
Purchase quarter	Quarter 1	1206	17.9
	Quarter 2	1542	22.9
	Quarter 3	1765	26.3
	Quarter 4	2207	32.8

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4.2. Latent Class Analysis

To explore the latent class of customers, this study used purchase quantity, product type, purchase quarter as observation variables. Starting from one type, the number of types was gradually increased for latent class analysis until the values of AIC and BIC in the model fitting index did not decrease [9]. The study examined five main statistical results to determine the best fit model: AIC, BIC, pLMR, pBLRT, Entropy. Among them, the values of AIC and BIC are used for model comparison. The smaller the value, the better the model fit. Entropy represents the classification accuracy. If the pLMR and pBLRT values of model i reach a significance level ($p < 0.05$), it indicates that the variance interpretation rate of model i is higher than that of model i-1 [10].

The model fitting results of public course learning are shown in Table 2. According to the model fitting results in Table 2, the pLMR and pBLRT of 2-class and 3-class all reached a significant level. Compared to 3-class, the AIC and BIC of 2-class was a slightly higher, but the Entropy value of 2-class is greater than 0.9. Therefore, it is ultimately determined that 2-class is the optimal latent class.

Table 2: Results of the latent class analysis for Chinese new energy compact SUV consumers

	AIC	BIC	pLMR	pBLRT	Entropy	Group proportion for each class
1-profile	43575.253	43643.382				1.00
2-profile	42959.496	43102.566	0.000	0.000	0.924	0.92/0.08
3-profile	42699.593	42917.604	0.000	0.000	0.656	0.64/0.04/0.32
4-profile	Not converge				0.077	0.023/0.023/0.024/0.030

Based on the results provided above, latent class 1 is defined as "Luxury brand preference buyer". This class is predominantly characterized by consumers who make a "Low" purchase quantity, with a very high probability (0.992). This suggests that most consumers in this class are likely to buy fewer new energy compact SUVs, which could indicate they are either first-time buyers or have a lower demand for such vehicles. Consumers in this class show a preference for "Luxury Brand 1" with a significant probability (0.340), indicating a clear inclination towards luxury brands. They also have a moderate preference for "Luxury Brand 3" (0.128) and "Normal Brand 6" (0.189), suggesting a mix of luxury and normal brand preferences. Purchase Quarter: The distribution of purchase across quarters is relatively even, with "Quarter 4" having the highest probability (0.327) for purchases, followed by "Quarter 3" (0.263), "Quarter 2" (0.233), and "Quarter 1" (0.177). This suggests that consumers in this class are more likely to make purchases towards the end of the year. Latent class 2 is the "Normal brand rejection buyer". This class is marked by a more balanced distribution across different purchase quantities. The majority of consumers in this class are likely to make a "Low" purchase (0.686), but there is also a significant proportion making "Moderate" (0.225) and "High" (0.089) purchases. This indicates a more diverse buying behavior compared to Latent Class 1. There is a strong preference for "Luxury Brand 2" (0.770), which is significantly higher than any other brand preference in both classes. This points to a distinct consumer segment that is highly attracted to a specific luxury brand. There is also a moderate preference for "Luxury Brand 3" (0.225), but "Normal Brands" (4, 5, and 6) are not preferred in this class. Purchase Quarter: The purchase distribution across quarters is more uniform compared to Latent Class 1, with "Quarter 4" having the highest probability (0.338) for purchases, followed by "Quarter 3" (0.264), "Quarter 2" (0.199), and "Quarter 1" (0.199).

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This suggests that consumers in this class are more likely to spread their purchases throughout the year, with a slight inclination towards the end of the year.

In summary, latent class 1 is characterized by consumers with a preference for luxury brands, particularly Luxury Brand 1, and a tendency to make fewer purchases, mostly in the last quarter of the year. In contrast, latent class 2 is defined by a strong rejection for normal brand and a more balanced distribution of purchase quantities and timing throughout the year. These insights can be valuable for targeted marketing strategies to meet the specific needs and preferences of these distinct consumer groups.

5. Discussion and Suggestion

The LCA conducted on the Chinese new energy compact SUV market has delineated two distinct consumer segments, each with its own set of preferences and behaviors, necessitating a nuanced approach to marketing strategies.

5.1. Luxury Brand Preference Buyers

"Luxury Brand Preference Buyers" are distinguished by their marked preference for luxury brands, particularly Luxury Brand 1, coupled with a tendency towards fewer purchases. These consumers are likely to be discerning, valuing the prestige and quality that luxury vehicles embody, and may exhibit higher levels of brand loyalty. The marketing strategies for this segment should focus on reinforcing the brand's position as a paragon of quality, innovation, and prestige. Targeted advertising through premium channels that resonate with affluent consumers, such as high-end events and premium media platforms, can effectively reach this demographic. Loyalty programs that reward repeat business and referrals can further strengthen brand loyalty. Given their propensity for purchases in the last quarter of the year, strategic seasonal promotions or the introduction of limited edition models could be particularly effective. Additionally, offering exclusive experiences or memberships that grant access to exclusive events and pre-launches of new models can enhance the sense of exclusivity and desirability associated with the brand.

5.2. Normal Brand Rejection Buyers

"Normal Brand Rejection Buyers" exhibit a clear preference for Luxury Brand 2 and a balanced distribution of purchase quantities, indicative of a more diverse buying behavior. Due to the high-end level, unique model design, and infotainment system, the attraction to Luxury Brand 2 may stem from its unique design, performance, or brand reputation, and this segment's rejection of normal brands underscores a strong inclination towards luxury and exclusivity. Marketing efforts should be concentrated on promoting the distinctive attributes of Luxury Brand 2, highlighting why it stands out among other luxury brands. Offering personalized options and customizations can cater to the varied preferences within this segment, allowing consumers to align their vehicle choices with their individual identities. Marketing content that elucidates the benefits and features of Luxury Brand 2 can assist consumers in understanding its superiority over normal brands. As there is no significant difference in consumer performance during the purchasing quarter, consistent year-round engagement through various marketing initiatives is essential to maintain consumer interest, given their spread-out purchasing behavior. Furthermore, fostering a community among Luxury Brand 2 owners through exclusive clubs, forums, or social media platforms can create a sense of belonging and facilitate the sharing of experiences and advice, thereby enhancing brand engagement and loyalty.

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6. Conclusion

The study on segmenting the Chinese new energy compact SUV market through latent class analysis (LCA) has successfully identified two distinct consumer segments, each with unique preferences and behaviors. The findings underscore the heterogeneity within the consumer base of new energy compact SUVs in China, highlighting the importance of a tailored marketing approach. The "Luxury Brand Preference Buyers" segment demonstrates a pronounced inclination towards luxury brands, particularly Luxury Brand 1, and is characterized by a tendency to make fewer purchases, predominantly in the last quarter of the year. This segment values the prestige and quality associated with luxury vehicles, exhibiting higher levels of brand loyalty. The insights from this study suggest that marketing strategies for this segment should emphasize reinforcing the brand's image as a symbol of quality and innovation. Seasonal promotions, exclusive experiences, and loyalty programs can be instrumental in enhancing brand engagement and driving sales. Conversely, the "Normal Brand Rejection Buyers" segment exhibits a strong preference for Luxury Brand 2 and a balanced distribution of purchase quantities, indicative of a diverse buying behavior. This segment's rejection of normal brands and attraction to Luxury Brand 2 suggests a strong inclination towards luxury and exclusivity. Marketing efforts for this segment should focus on promoting the unique attributes of Luxury Brand 2, offering personalized options, and providing educational content that elucidates its superiority. Consistent engagement and fostering a community among Luxury Brand 2 owners can further enhance brand loyalty and consumer satisfaction.

The LCA conducted in this study provides actionable insights for automotive marketers, enabling them to develop more effective and targeted marketing strategies. By understanding the nuanced preferences and behaviors of different consumer segments, enterprises can better align their products and marketing communications to meet the specific needs of their target audience. This study contributes to the research on consumer behavior and market segmentation in the context of the burgeoning new energy vehicle market in China, offering a robust analytical framework that can be applied to other emerging markets and product categories. In conclusion, the segmentation of the Chinese new energy compact SUV market based on consumer preferences is a critical step towards optimizing marketing strategies and enhancing consumer satisfaction. The findings of this study not only offer valuable insights for marketers but also provide a foundation for future research in consumer behavior and market segmentation within the new energy vehicle sector.

References

[1] *Ma, Y. Y., Duan, S. D., ..., & Zhang, T. J. (2023). Multi-scale analysis of the co-movement between China's new energy vehicle industry and Tesla: Evidence from capital market. Energy & Environment (Early Access).*

[2] *Tan, Q. B., Wang, Z. N., ..., & Zhao, Z. H. (2023). Development Path and Model Design of a New Energy Vehicle in China. Energies, 16(1).*

[3] *Wang, Z. C., Li, X. Y., ..., & Liu, Y. H. (2022). More government subsidies, more green innovation? The evidence from Chinese new energy vehicle enterprises. Renewable Energy, 197, 11-21.*

[4] *Qiao, G. Y. (2014). Policy options to promote Chinese new energy vehicles consumption. Chinese Journal of Population Resources and Environment, 12(3), 233-238.*

[5] *Deng, J., & Nam, E. Y. (2022). Effects of Chinese firms' innovation on new energy vehicles purchases. Sustainability, 14(19).*

[6] *Rao, L. (2015). Exploration of marketing promotion strategies for new energy vehicles. Business Economic Research, (15), 54-55.*

[7] *Yang Zaoli,Li Qin,Yan Yamin,Shang Wen-Long & Ochieng Washington.(2022).Examining influence factors of Chinese electric vehicle market demand based on online reviews under moderating effect of subsidy policy.Applied Energy.*

[8] *Hemant R Kulkarni & Meherbano M Kamal.(2001).Latent class analysis - A handy tool to evaluate diagnostic tests in the absence of a "Gold Standard".Journal of Cytology(2),105-114.*

DOI: 10.54254/2754-1169/109/2024BJ0131

[9] *Nylund, K. L., Asparouhov, T. & Muthén, B. O. (2007). Deciding on the number of classes in latent class analysis and growth mixture modeling: a Monte carlo simulation study. Structural Equation Modeling: A Multidisciplinary Journal(4), 37-41.*

[10] *Foti, R. J., Bray, B. C., Thompson, N.J., & Allgood, S. F. (2012). Know thy self, know thy leader: contributions of a pattern-oriented approach to examining leader perceptions. Leadership Quarterly, 23(4), 702-717.*