

Research on the Comprehensive Evaluation Method of Automotive Product Competitiveness Driven by User Experience

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Abstract

As a key factor influencing users' purchasing decisions, the competitiveness of automotive products is of great significance in terms of its quantitative evaluation. From the perspective of user experience theory, this study adopts big data analysis methods to construct a systematic research framework for evaluating the competitiveness of automotive products. The research focuses on two core tasks: the establishment of an evaluation index system and the development of an application model for business scenarios. Through the analysis of automotive research data and big data on user word-of-mouth, a multi-dimensional evaluation index system covering both product-related competitiveness and non-product-related competitiveness is established. Furthermore, a targeted scenario-based evaluation model is developed for the medium-sized and large-sized new energy SUV segment, with evaluation verification conducted simultaneously. The research results indicate that this method can effectively extract the characteristics of user experience in specific vehicle usage scenarios. It provides a scientific empirical basis for automakers to accurately grasp user needs and optimize product strategies, while also laying a foundation for building and enriching the database of research and production factors in the automotive industry.

Keywords

User Experience; Product Competitiveness; Vehicle Evaluation Method; Product Competitiveness

1. Introduction

In the current automotive industry, user experience has become a key factor that directly affects consumers' purchasing decisions and brand loyalty. With the development of technology and changes in the market, users' demands for cars are becoming increasingly diverse, which requires manufacturers to make more refined adjustments in product design and functionality. This study adopts a scenario based comprehensive evaluation method for product power, aiming to comprehensively understand and analyze consumers' car experiences in different usage scenarios. Through this method, more specific and contextualized user feedback can be captured, providing more targeted guidance for automotive design and improvement. The research results not only help manufacturers better understand user needs, but also provide empirical basis for future research and innovation in automotive user experience.

2. Assessment of Automotive Product Competitiveness

Automotive Product Competitiveness refers to the competitive ability of automotive products in the market, covering multiple dimensions such as design, technology, performance, brand, price, and quality. In today's increasingly fierce global competition, enhancing the competitiveness of automobile products has become an important goal for major automobile

manufacturers. The competitiveness of automobile products not only affects the market performance of a single brand, but also greatly influences the technological development and market pattern of the entire industry. More importantly, the power of automobile products affects users' choices and purchasing behavior, and is a factor directly related to automobile sales, which is of great significance(Zhao et al., 2020)^[1]. With the diversification of consumer demand and changes in the global market, the competitiveness of automotive products will continue to be the key to the success of car manufacturers.

The assessment of automotive product competitiveness involves complex interplay among multiple factors, including design and innovation, brand and influence, pricing and value for money(Lee et al., 2019)^[2]. Consequently, evaluating automotive product competitiveness has long been a challenging and critical focus within the automotive research industry. As consumer expectations for automotive products continue to rise—particularly regarding intelligence, comfort, safety, and personalization, automakers increasingly prioritize enhancing product competitiveness through optimized user experience. User Experience (UX) has emerged as a critical factor in elevating automotive product competitiveness. UX methodologies have also become an effective approach for evaluating automotive product competitiveness from a human-centered perspective.

First, evaluations grounded in user experience methodologies can assess consumer loyalty and satisfaction toward brands(Zhang, 2019)^[3]. As a long-term ownership product, automotive purchasing decisions depend not only on exterior design and technical specifications but also on the comfort, convenience, and enjoyment derived from daily driving experiences. Details such as in-car entertainment systems, intelligent voice assistants, seat comfort, and the intuitiveness of control interfaces directly impact the experience of both drivers and passengers. Brands like Tesla and BMW enhance market appeal by providing intuitive, intelligent in-car interfaces and control systems that deliver smoother, more enjoyable driving experiences(Huang, 2020)^[4].

Secondly, the integration of intelligent technologies can be reflected in the automotive user experience, particularly through innovations in autonomous driving, vehicle connectivity, and intelligent driver assistance systems. Modern consumers not only expect vehicles to deliver outstanding power and safety during operation but also place greater emphasis on whether intelligent features can enhance driving safety and convenience. For instance, autonomous driving technology frees drivers' hands, allowing them to relax during extended journeys, while smart connectivity offers more personalized services to owners. The continuous advancement of these intelligent functions significantly elevates the consumer experience, becoming a crucial factor for many automotive brands competing for market share(Smith et al., 2021)^[5].

Finally, a positive user experience is not solely achieved through the product itself; it must be further enhanced by quality after-sales service, maintenance guarantees, and interactions between consumers and the brand. For instance, comprehensive online service platforms and timely fault diagnosis and repair services enable consumers to feel greater care and convenience during purchase and usage, thereby boosting their trust and reliance on the brand (Yang et al., 2021)^[6].

In summary, user experience has become a core element in enhancing automotive product competitiveness. Through comprehensive evaluation and testing across intelligent design, comfort optimization, and service dimensions, assessments can be conducted across multiple facets—including design, technology, branding, and pricing—to drive technological innovation, brand development, and market positioning. This approach assists enterprises in securing a leading edge within increasingly fierce market competition.

3. User Experience Research Methods Based on Product Status and Common Characteristics of Consumer Groups

Evaluating automotive product appeal from a user experience perspective is an effective method for optimizing vehicle assessments(Kumar & Sharma, 2020)^[7]. However, current automotive user experience evaluations face the following challenges: First, automotive manufacturers predominantly develop products based on engineering metrics, while market research questionnaires are designed around engineering-centric questions. This approach emphasizes an engineering mindset over a user-centric one, resulting in insufficient depth in researching user-perspective experiences. Therefore, evaluation systems must be designed around key points of actual consumer driving experiences. Collaborative industry research should develop new evaluation logics and methodologies to meet consumer demand for vehicle experience assessment information(Wang et al., 2022)^[8]. Second, as evaluation systems are implemented, research methods innovate, and user needs evolve, continuous refinement and optimization of these systems are essential. This ensures consumers receive vehicle evaluation data aligned with real-world usage experiences, making results closely reflect actual driving perceptions. Such efforts will drive technological advancement and enhance innovation capabilities within the automotive industry.

Building upon this foundation, this study has established a scenario-based comprehensive evaluation system for automotive product competitiveness. Focusing on consumer priorities during vehicle purchase and ownership, it leverages big data analytics to collaborate with representatives from automakers, universities, research institutions, media outlets, and consumer groups. This collaborative effort identifies and filters core metrics and pain points that users prioritize when buying and using vehicles. This automotive product strength evaluation reflects both the overall product experience and scenario-specific performance. It provides consumers with purchasing guidance while motivating manufacturers to enhance vehicle technology and quality, prioritize actual user experience, and ultimately elevate customer satisfaction.

4. Establishing a Product Competitiveness Evaluation System Focused on Both Product-Related and Non-Product-Related Factors

4.1. Indicator System Determination Rules

To comprehensively cover dimensions of concern during vehicle purchase and usage, this product competitiveness evaluation system comprises two major components: product capability evaluation and non-product capability evaluation. The product capability evaluation system is segmented based on vehicle usage scenarios, including: - Level 1: Vehicle Status - Level 2: Scenario Classification - Level 3: Scenario Objectives - Level 4: Functional/Performance Metrics. The non-product capability evaluation system is segmented based on users' perceived value during vehicle usage, including: - Level 1: Value Categories - Level 2: Dimensions of Concern - Level 3: Specific Content Metrics

Based on the current state of automotive products and the common characteristics of consumer groups, this paper identifies nine distinct market segments: micro and small sedans, compact sedans, midsize and full-size sedans, large sedans, micro and small SUVs, compact SUVs, midsize and full-size SUVs, large SUVs, and MPVs. For each segment, big data methods were employed to extract mainstream consumer scenarios, concerns, and core pain points from user reviews. This analysis was combined with automotive technology trends and supplemented by gathering input from industry professionals—including automakers, universities, research institutes, and media—as well as consumer representatives to establish an evaluation metric

system. For each segment, experts determined the weighting for each metric level based on the segment's technological trends and consumer characteristics.

The evaluation metric system defines the scope for assessing product competitiveness, providing guidance for automakers to improve their products and services. However, due to differences in user knowledge levels and comprehension abilities, varying users interpret each evaluation metric differently. Gathering firsthand user feedback on vehicles is crucial for comprehensively evaluating product competitiveness from the user experience perspective. Therefore, this paper refines the evaluation metrics into specific pain points expressed in user language based on identified common user frustrations. Users inspect these pain points, triggering deductions in the form of point deductions to assess the competitiveness dimensions of automotive products. The user complaint deduction system represents a significant innovation in automotive comprehensive evaluation. On one hand, it addresses the issue of inaccurate evaluation results caused by users' misunderstanding or misinterpretation of evaluation metrics, making the evaluation content more accessible and understandable. On the other hand, it avoids the problems of widespread mediocre scores and ambiguous evaluations that arise from direct user scoring methods, making the score results interpretable and quantifiable.

Table 1: Core Advantages of the Flaw-Based Deduction System (Compared to the 10-Point scale)

Dimension	Deduction System for Flaws	10-Point Scale
Problem Localization Accuracy	Quantifiable experiences, precisely pinpointing user pain points (such as screen lag)	Vague defect location (users may give a 7 out of 10 rating because "it's generally okay")
Improve Priority Ranking	Identify top improvement items based on penalty point concentration	Low-scoring items require manual categorization, making it easy to overlook hidden pain points.
Word-of-Mouth Communication Prevention and Control	Identify issues to help companies tailor their public relations efforts in response to negative news.	The scores for the Doctrine of the Mean are generally clustered around 6 to 8 points, with little differentiation.

4.2. Evaluation Score Calculation Method

4.2.1. Calculation of Overall Product Competitiveness Score

The total product competitiveness score for a vehicle model is calculated based on the product strength score, non-product strength score, and their respective weights, rounded to one decimal place. The calculation formula is as follows:

$$G = P \times w_{\text{product}} + N \times w_{\text{non-product}} \quad (1)$$

Among these, G represents the total product competitiveness score for the vehicle model, P denotes the product competitiveness score, and N denotes the non-product competitiveness score. w_{product} and $w_{\text{non-product}}$ denote the respective weights assigned to product competitiveness and non-product competitiveness.

4.2.2. Calculation of Evaluation Scores for fourth-level Product Capability Metrics and Third-level Non-Product Capability Metrics

Users conduct spot checks on the fifth-level experience pain points of product capability. Triggering a pain point results in point deductions. Each fourth-level functionality/performance metric has a total score of 10 points. The number of experience pain

points under each fourth-level metric is denoted as m . The scoring formula for each experience pain point is as follows:

$$c_i = \frac{10}{m_i} \quad (2)$$

Here, c_i denotes the score for each pain point under the i -th fourth-level indicator, and m_i denotes the number of pain points under the i -th fourth-level indicator.

The scoring formula for each fourth-level functional/performance indicator is as follows:

$$f_i = 10 - n_i c_i \quad (3)$$

Where f_i represents the score for the i -th fourth-level indicator, and n_i denotes the number of user-triggered pain points under the i -th fourth-level indicator.

The scoring method for non-product-related third-level indicators follows the same principle.

4.2.3. Calculation of Product Capability and Non-Product Capability Scenario Evaluation Scores

The arithmetic mean of the four-level scenario scores constitutes the third-level scenario score, calculated as follows:

$$t_i = \left(\sum_{q=1}^{n_i} f_{ij} \right) / e_i \quad (4)$$

Here, t_i denotes the score for the i -th tertiary indicator, f_i represents the score for each quaternary indicator under the i -th tertiary indicator, and e_i indicates the number of quaternary indicators under the i -th tertiary indicator.

The scoring method for non-product capability secondary scenarios aligns with that for product capability tertiary indicators.

The secondary scenario score for product capability is calculated based on tertiary indicator scores and their respective weights, using the following formula:

$$s_j = \sum_{i=1}^k t_{ij} \times w_{ij} \quad (5)$$

Here, s_j denotes the score for the j -th secondary scenario, k represents the number of tertiary indicators under the j -th secondary scenario, and t_{ij} and w_{ij} denote the score and weight, respectively, for the i -th tertiary indicator under the j -th secondary scenario.

The calculation methods for the primary scenario scores and total scores of product capability, as well as those for non-product capability primary scenarios, follow the same principle. They are derived from the corresponding scores and weights of the next-level scenarios.

4.3. User Review Implementation Principles

4.3.1. Research Subjects

Research participants must meet the following criteria:

- (1) Primary decision-maker in vehicle selection and purchase, primary user of the vehicle model, and the vehicle must be the participant's most frequently used vehicle;
- (2) 3-18 months post-purchase;
- (3) Have not participated in any automotive-related market research within the past 6 months;
- (4) Exclude individuals employed in automotive manufacturing, sales/service, or related industries;
- (5) Represent a diverse pool of automotive users across gender, education level, age group, occupation, and purchase type (first-time buyers, upgrades, replacements).

4.3.2. Survey Locations

Considering regional differences in demographic characteristics and usage needs, survey cities should encompass representative Tier 1 to Tier 5 cities across seven major geographic regions:

East China, North China, Central China, South China, Southwest China, Northwest China, and Northeast China. The survey will be conducted via PAD questionnaires through scheduled in-person interviews. Each vehicle model must have a minimum of 100 valid samples.

4.3.3. Survey Implementation

(1) User surveys shall be conducted through scheduled in-person interviews. The specific process includes: telephone screening of respondents, scheduling interview times, on-site verification, photographing vehicles, photographing identification documents, administering questionnaires, and supervisor verification of questionnaires;

(2) Survey personnel shall ensure the accuracy and authenticity of survey data while maintaining survey progress;

(3) Upon completion, collect interviewee recordings, vehicle registration or driver's license photographs, and other materials for verification. Questionnaires failing to meet requirements shall be discarded and excluded from final score calculations.

5. Application of the Product Competitiveness Evaluation System for Assessing Both Product and Non-Product Factors

The empirical section conducted research and validation using the mid-size and large-size new energy urban SUV segments as case studies. Based on industry data for mid-size and large new energy SUVs, experts from nearly 20 automakers and media outlets participated in voting on segment-specific indicators and weightings. Combining expert recommendations, the final indicator system and weightings for this segment were determined. Concurrently, 25 mid-size and large new energy urban SUV models were selected for user evaluation, with each model receiving no fewer than 100 user samples. The evaluation covered eight representative cities nationwide.

5.1. Establishing the Competitiveness Evaluation System for Mid-Size and Full-Size New Energy SUVs

5.1.1. Insights into the Demographic Characteristics of Mid-Size and Full-Size New Energy SUV Buyers

The primary consumer base for mid-size and full-size new energy SUVs consists of married men aged 30-40, with a gradually increasing proportion of female buyers. Most households comprise four members, with annual incomes generally exceeding ¥400,000. Occupations are concentrated among highly educated groups such as professionals in internet technology, finance, and private enterprise owners. Geographically, they are predominantly located in new first-tier and higher-tier cities.

Their primary purchase motivations involve adding or upgrading vehicles, with a focus on family outings, commuting, and travel scenarios. They prefer models offering spacious interiors, comfort and safety, and rich intelligent features. Lifestyle-wise, they pursue quality living, technological sophistication, and personalization, demanding high standards for brand and service experiences. They represent typical middle-to-high-income, family-oriented users.

5.1.2. Technical Trends in Mid-Size and Full-Size New Energy SUVs

Technical trends for mid-size and full-size new energy SUVs primarily revolve around powertrain diversification, intelligent features, spatial innovation, battery and fast-charging upgrades, lightweighting and environmental sustainability, as well as enhanced cost-effectiveness.

Power systems in this segment predominantly feature extended-range and pure electric configurations. Extended-range models balance range and economy, while pure electric variants widely support 800V fast charging and offer ranges exceeding 600 kilometers.

Intelligence has become a core competitive advantage, with rapid adoption of Level 2+ to Level 3 autonomous driving, multi-screen smart cockpits, AI voice assistants, and high-end chips. Vehicles typically exceed 5 meters in length, featuring 6- or 7-seat configurations, flexible seating arrangements, and abundant comfort features. Battery and fast-charging technologies continue to advance, while lightweight and eco-friendly materials see increased adoption. Price points are gradually shifting downward to the ¥200,000–400,000 range, significantly boosting cost-effectiveness and driving rapid market penetration growth.

Looking ahead, as technology trickles down and pricing becomes more accessible, this segment is poised to continue leading new energy vehicle growth, becoming the core vehicle for family transportation and technological experiences.

5.1.3. Establishing the Competitiveness Evaluation System for Mid-Size and Full-Size New Energy SUVs

Based on the characteristics of mainstream consumers and technological trends in the mid-size and full-size new energy SUV market, targeted evaluation metrics and common pain points were extracted from user reputation big data to serve as specific evaluation content. Concurrently, input was solicited from industry experts and consumer representatives, and weightings were assigned to the metrics.

The product competitiveness evaluation system for mid-size and large new energy SUVs comprises two major components: the product capability system and the non-product capability system. The Product Capability Evaluation System comprises two primary indicators: Driving State and Non-Driving State. It features 10 secondary scenario classifications. Non-Driving State includes Departure Preparation, Temporary Parking, Recharging, and Leaving the Vehicle. Driving State encompasses Urban Driving, Long-Distance Driving, Suburban Driving, Parking, Driving in Special Weather Conditions, and Extreme Driving Conditions. Additionally, it includes 21 tertiary scenario objectives and 60 quaternary functional/performance indicators. The specific indicator system and weightings are detailed in Table 2. The non-product capability indicator system comprises three primary indicators: emotional value, experiential value, and economic value. It further divides into ten secondary dimensions: emotional value encompasses brand strength, design appeal, social attributes, and recommendation rate; experiential value covers pre-sales experience, after-sales experience, and user care; economic value includes pricing, insurance, and residual value. Additionally, it contains 25 tertiary-level specific contents. The detailed indicator system and weightings are presented in Table 3. Product-related and non-product-related factors are weighted at 60% and 40%, respectively.

Table 2: Product Competitiveness Evaluation Indicator System

Primary Vehicle Status	Primary Weight	Secondary Scene Classification	Secondary Weight	Tertiary Scenario Objectives	Tertiary Weight	Level 4 Functional/Performance Indicators
Non-driving state	35%	Preparing to depart	40%	Remote control	40%	Vehicle location display
						Door/Trunk open/close control
						Air conditioning on/off control
						OTA updates
			60%	Pre-drive preparation	60%	Keyless/NFC key usability
						Bluetooth key usability
						Access convenience (welcome feature, seats, doors, steering wheel, etc.)
						navigation planning
						Car-to-Phone connectivity

Primary Vehicle Status	Primary Weight	Secondary Scene Classification	Secondary Weight	Tertiary Scenario Objectives	Tertiary Weight	Level 4 Functional/Performance Indicators
Driving status	65%	Temporary parking	25%	Parking for rest	45%	Seat settings
				Parking for recreation	55%	Entertainment features
			25%	Charging	100%	External power supply
						Reserve charging
		Exit the vehicle	10%	Locked the car and left	100%	Charging convenience
						Auto lock
						Trunk open/Close control
						Mobile app alerts
		Urban Access	30%	Commuting	40%	Low-to-medium speed dynamic performance
						Driver-centric voice interaction
						Navigation execution (familiar routes) and infotainment
						Driver assistance features
			30%	Picking up and dropping off family members	35%	Ride comfort (Space, Seats, Air conditioning, Motion sickness)
						Passenger boarding and alighting convenience
						Passenger entertainment features
						Child care features
			20%	Shopping/Moving	25%	Luggage compartment space
						Navigation execution (Unfamiliar locations)
						Mid-to-High speed dynamic handling
						Ride comfort
		Long-distance travel	20%	Expressway travel (commuting between cities/self driving travel/go home)	100%	Driver assistance (Highway)
						Navigation execution (Highway)
						Energy consumption/Range/Charging
		Suburban Access	15%	Countryside Excursion	55%	Vehicle passability
						Chassis comfort
				Traveling in mountainous areas	45%	Extended functionality
						Hill and curve handling performance
		Parking	15%	Driver parking operation	60%	Seat support and contouring
						Panoramic/Holographic Imaging/Radar
				Operating Parking with Driver Assistance Features	40%	Shift lever operation convenience
						Parking assistance
		Special Weather Access	10%	Night driving	45%	Remote parking
						Lighting and visibility
						Safety warning features
				Driving in rainy and foggy weather	30%	Driver assistance systems
						Front windshield defrosting Capability
						Windshield wiper visibility
				Traveling in snowy weather	25%	Water wading capability
						Snow removal and interior heating
		Ultimate Passage	10%	off-road	20%	Handling stability on slippery surfaces
						Urban off-road passability
				Aggressive driving	15%	Off road off-road passability
						dynamic response
				Driving in	35%	Transient manipulation stability
						Low temperature endurance

Primary Vehicle Status	Primary Weight	Secondary Scene Classification	Secondary Weight	Tertiary Scenario Objectives	Tertiary Weight	Level 4 Functional/Performance Indicators
				Cold Weather		Heating performance
						Low temperature charging
						High temperature endurance
				Driving in Hot Weather	30%	Cooling performance
						High temperature charging
						in-car odor

Table 3: Non-Product Capability Evaluation Indicator System

Primary Level Value Classification	Primary Weight	Secondary Attention Dimension	Secondary Weight	Specific Content of Level 3						
Emotional value	40%	Brand Power	30%	Brand awareness Brand value (Ability to Command a Premium)						
		Visual Appeal	35%	Exterior design Interior design Interior materials Luxury ambiance creation						
				Social Engagement	20%	Social buzz potential				
				Recommendation Rate	15%	Brand extension merchandise Repurchase recommendation rate				
				Experience value	35%	Pre-Sales Experience	40%	In-Store experience Test drive experience Sales staff service		
		After-Sales Experience	35%			Convenience of after-aales service network locations Ease of replacement for wear parts Cost-effectiveness of accident repairs Roadside assistance policy				
						Customer Care	25%	Customer events Community building Feedback collection channels		
Economic value	25%							Pricing	55%	Competitive pricing
								Insurance	25%	Reasonable insurance premiums
		Retention Rate	20%			Official trade-in policy Strong resale value in the used car market				

Based on the established evaluation framework, key common pain points in users' vehicle purchasing and usage experiences are extracted from big data on user feedback. These points serve as specific evaluation criteria for designing a survey questionnaire, which is then distributed to a broad user base for research purposes.

5.2. Research Implementation

Based on high sales volume, high market popularity, and active user engagement across all platforms, 25 mid-size and large new energy SUV models that have been on sale for at least three months were selected for evaluation. The list is as follows.

Table 4: Evaluated Mid-Size and Full-Size New Energy SUV Models

Brand	Model	Fuel Type	Brand	Model	Fuel Type
Tesla	Model Y	BEV	VOYAH	VOYAH FREE	EREV
Li Auto	Li Auto L9	EREV	ARCFOX	ARCFOX αT5	BEV
Li Auto	Li Auto L6	EREV	NIO	NIO ES8	BEV
DEEPAL	DEEPAL S07	EREV	LYNK&CO	LYNK&CO 09 EM-P	PHEV
AITO	AITO M9	EREV	DENZA	DENZA N7	BEV

LYNK&CO	LYNK&CO 08	PHEV	Trumpchi	Trumpchi ES9	PHEV
XPeng Motors	XPeng Motors G6	BEV	LEAPMOTOR	LEAP C16	EREV
BMW	BMW iX3	BEV	Jiyue Automobile	Jiyue 01	BEV
WEY	LanShan	PHEV	Toyota	bZ 4X	BEV
Aion	Aion V	BEV	EXEED	STERRA ET	EREV
BYD	Song L DM	PHEV	Volkswagen	Volkswagen ID.6 X	BEV
IM Motors	IM Motors LS6	BEV	Eπ	eπ008	EREV
Avat	Avat 11	BEV			

The surveyed cities represent key sales regions and urban tiers within this market segment. The sample size is allocated based on the sales proportion, and offline PAD face-to-face interviews are used for the research. Specific surveyed cities and per-vehicle sample size distribution are as follows.

Table 5: Evaluation Cities for Mid-Size and Full-Size New Energy SUVs

Region	City (8)	city level	2024 Market Segment Sales	Single vehicle sample quota (100)
East China	Shanghai	1	184838	21
	Hangzhou	1.5	145527	17
	Hefei	2	51035	6
South China	Shenzhen	1	126358	15
	Dongguan	1.5	44325	5
North China	Beijing	1	128090	15
Central China	Zhengzhou	1.5	78357	9
Southwest China	Chongqing	1.5	99836	12

5.3. Analysis of Evaluation Results

This survey collected a total of 2,552 samples. After data verification, each user evaluation metric was statistically analyzed and scored using the scoring methodology outlined in Section 3.2.

The results indicate that overall user satisfaction with the product capabilities of mid-sized and large new energy SUVs is higher than that of non-product capabilities. The gap between the highest and lowest scores is significant, as shown in Figure 1.

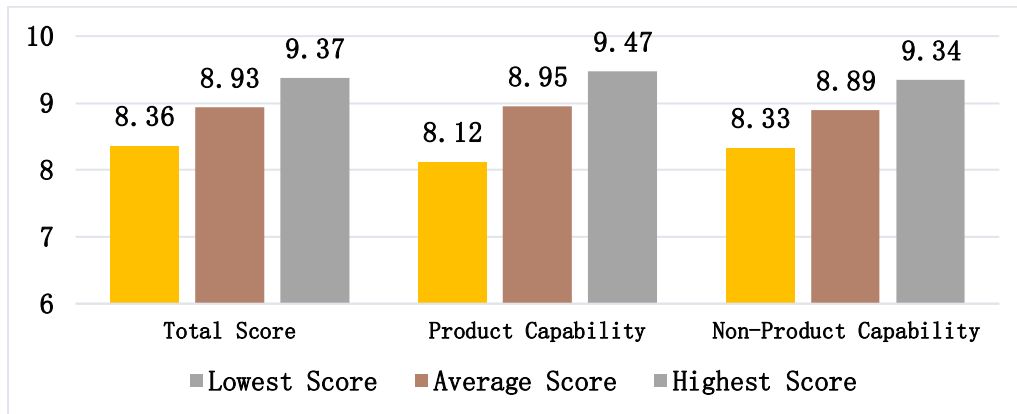


Figure 1 Satisfaction Evaluation Scores

By vehicle model, the LanShan scored highest, followed by the AITO M9 and Li Auto L9, all achieving overall scores above 9 points. Among these, the AITO M9 received the highest product capability score. The ShanHai T2, Aion V, and Volkswagen ID.6 X performed poorly, with the Volkswagen ID.6 X in particular needing significant improvement in product capability.

Table 6: Scores for Top 3 Mid-Size and Full-Size New Energy SUV Models

Brand	Model	Product capability	Non-product capability	Total score
WEY	LanShan	9.44	9.27	9.37
AITO	AITO M9	9.47	9.13	9.33
Li Auto	Li Auto L9	9.45	9.11	9.32

Table 7: Scores for Bottom 3 Mid-Size and Full-Size New Energy SUV Models

Brand	Model	Product capability	Non-product capability	Total score
Jetour	Shanghai T2	8.63	8.49	8.57
Aion	Aion V	8.55	8.33	8.46
Volkswagen	Volkswagen ID.6 X	8.12	8.72	8.36

The top three most frequent vehicle usage scenarios in this segment are commuting to and from work, picking up family members, and shopping/transporting goods. The specific distribution of usage scenarios is shown in Figure 2.

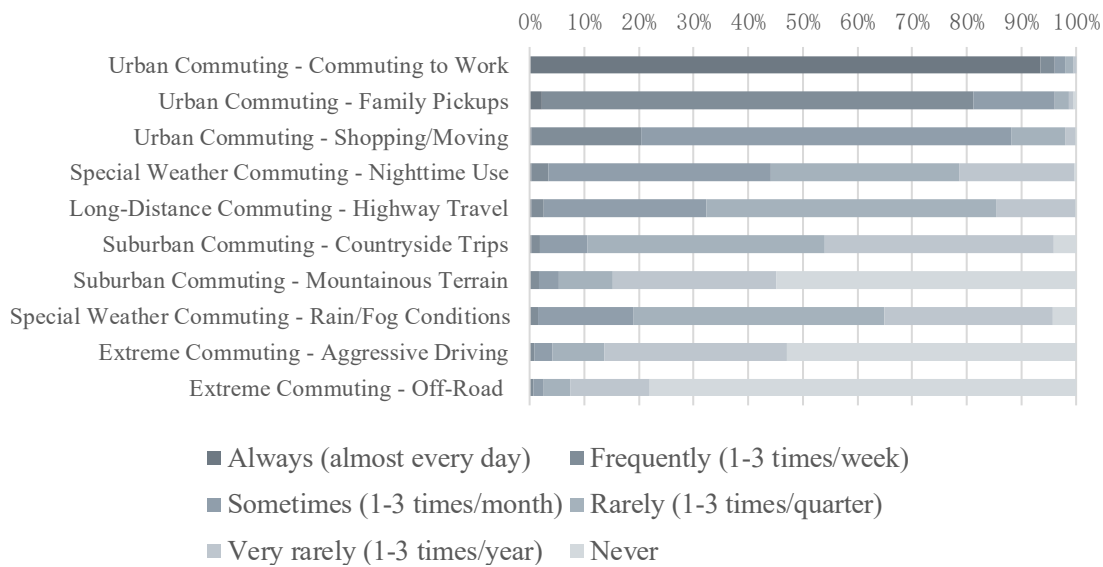


Figure 2: Usage Scenario Distribution in the Mid-Size and Full-Size New Energy SUV Segments

In the product capability segment, driving performance showed relatively balanced satisfaction levels. The highest and lowest satisfaction ratings both occurred during non-driving scenarios—specifically, during charging and temporary parking situations, as illustrated in Figure 3.

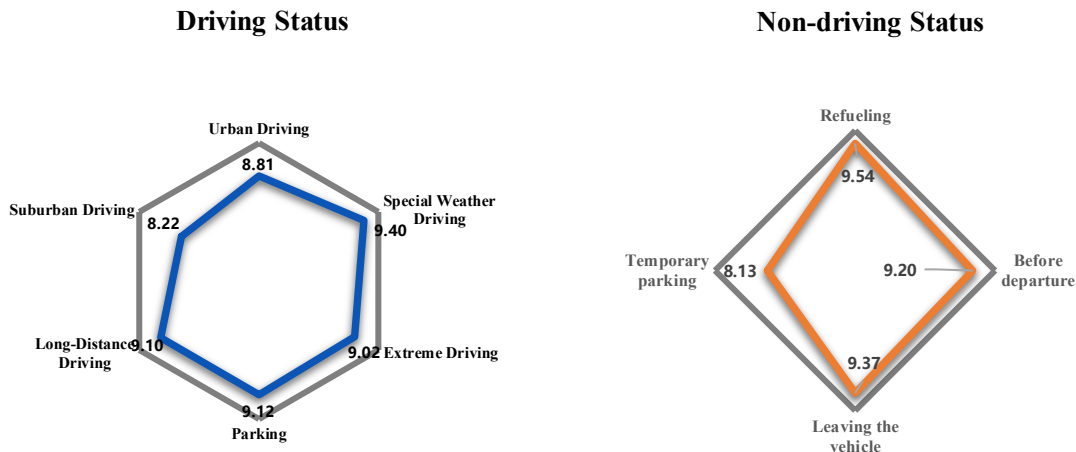


Figure 3: Product Performance in Driving and Non-Driving Conditions

In non-product-related aspects, mid-size and large new energy SUVs deliver high emotional value to users. Customers express satisfaction with the vehicle's styling and are willing to recommend it to others, though after-sales service experiences require improvement, as shown in Figure 4.

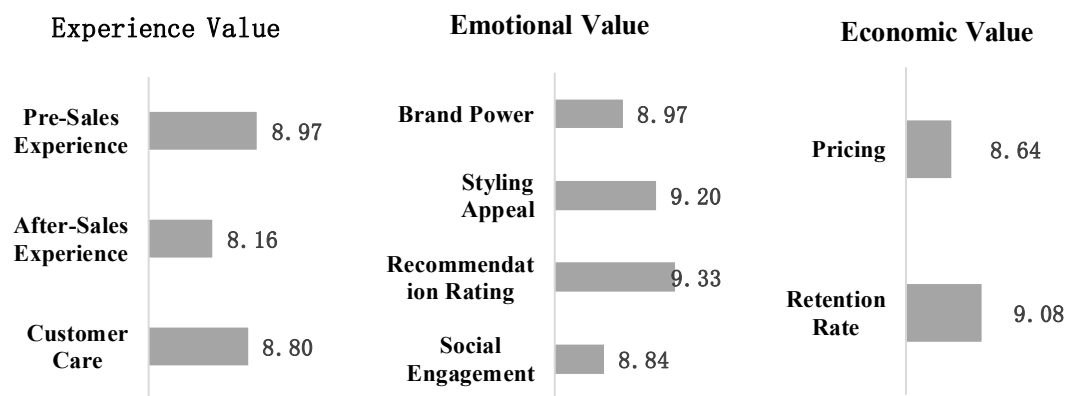


Figure 4: Non-Product Performance

The primary complaints regarding mid-size and large new energy SUVs are shown in Table 8. Users expressed the most dissatisfaction with urban pilot assist features, primarily citing unreasonable automatic adjustments and inaccurate environmental recognition. The second most common complaint was that the infotainment screen failed to meet their needs.

Table 8: Top 5 Complaints for Mid-Size and Full-Size New Energy SUVs

Category	Complaints	Grumbly Rate
Driver Assistance Features	Urban Pilot Assist's automatic adjustments for speed, steering, and braking are unreasonable.	77%
	Urban Pilot Assist's recognition of surrounding environments is inaccurate.	76%
Entertainment Features	No passenger-side entertainment screen/insufficient entertainment features on the passenger screen, failing to meet needs.	68%
Comfort Features	Seat massage function intensity is uncomfortable.	50%
Expanded Features	No roof rack/roof box, cannot carry additional luggage or outdoor gear	34%

High satisfaction points for mid-size and large new energy SUVs (lower complaint rates indicate higher satisfaction) are shown in Table 9. Users expressed high satisfaction with charging convenience, followed by remote air conditioning control.

Table 9: Bottom 5 Complaints for Mid-Size and Full-Size New Energy SUVs

Category	Complaints	Grumbly Rate
Charging and Recharging	After scheduling a charge, the vehicle fails to start charging precisely at the set time.	2%
	The charging port frequently freezes, preventing it from opening or enabling charging.	2%
Remote Control	When remotely controlling the air conditioning, the system often fails to turn the AC on or off.	2%
After-Sales Service	After vehicle malfunctions, the quality of replacement parts installed by after-sales service is	2%

	subpar.	
OTA Experience	OTA updates require significant learning effort, with either excessive or impractical upgrade content.	3%

6. Conclusion

Automotive product appeal significantly influences consumer choice and purchasing behavior, making its quantitative study highly significant. As consumer demands for automobiles grow increasingly diverse and personalized, traditional product appeal models and single-dimensional evaluation methods can no longer fully meet market requirements. Against this backdrop, user experience-based research methodologies offer a novel perspective for assessing automotive product appeal. The user experience approach emphasizes evaluating a vehicle's performance and perceived qualities from the consumer's perspective during actual usage. This enables a more comprehensive revelation of factors influencing consumer purchasing decisions and overall ownership experience.

This study has developed a more detailed and precise product strength evaluation system by comprehensively considering consumers' usage scenarios and demand characteristics. The system not only focuses on traditional product strength factors such as hardware performance and functional configurations but also delves into non-product-related dimensions closely tied to consumers' daily driving experiences, including pre-sales experiences and user care. These dimensions collectively form a comprehensive framework for automotive product strength. By analyzing big data from vehicle model research and user reviews, the study identified primary usage needs across different market segments. This enabled the refinement of targeted evaluation metrics and weightings, achieving more precise user experience data collection. During the quantitative evaluation process, the research not only focuses on users' fundamental experiences with various vehicle functions but also emphasizes uncovering deeper perceptual factors, such as emotional feedback during driving and the interactive experience between drivers and their vehicles. These granular metrics provide automakers with valuable reference data, enabling them to better understand consumers' latent needs and preferences. This insight allows for more targeted adjustments in product design, feature optimization, and market positioning. Through these quantitative research findings, automakers can achieve more precise market positioning and gain a competitive edge in the fiercely contested marketplace.

Furthermore, this study provides a more accurate and reliable empirical foundation for analyzing and optimizing automotive product competitiveness. Traditional automotive evaluation methods often focus solely on single-dimensional performance metrics while overlooking consumers' multidimensional perceptions and evolving needs during usage. By adopting a user experience approach, manufacturers can obtain more authentic and comprehensive market feedback. This enables them to identify potential issues in their products and services, implement timely improvements and optimizations, and ultimately enhance overall consumer satisfaction.

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