

Problems and Optimization Paths of Emergency Rescue After-Sales Service for Premium New Energy Vehicles

Meng Ma*, Jianhong Tao

Shaanxi University of Science and Technology, Xi'an, Shaanxi, 710021, China

*Corresponding author: Meng Ma, 1007940539@qq.com

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Abstract: With the rapid growth of high-end new energy vehicles, emergency rescue services have become a key scenario for measuring brand after-sales ability and user experience. This article systematically reviews the development status of the emergency rescue after-sales service of high-end new energy vehicles, deeply analyzes the existing problems and their deep causes, and puts forward an optimization path from the five dimensions of service network construction, professional ability improvement, standard system construction, intelligent empowerment and service model innovation, so as to improve the after-sales service of high-end new energy vehicles. System and promote the high-quality development of the industry to provide theoretical reference and practical ideas.

Keywords: Premium New Energy Vehicles; Emergency Rescue; After-Sales Service; High-End Brand; Service Optimization

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1. Introduction

Driven by the “dual carbon” goal and industrial upgrading, new energy vehicles have become the mainstream direction of the green transformation of global automobile enterprises, and are also the strategic choice for the high-quality development of China’s automobile industry. At present, the focus of industry development has shifted from scale expansion to quality improvement, and high-end transformation has become the core trend of industry development. According to the data of the China Association of Automobile Manufacturers, the production and sales of new energy vehicles in China will reach 16.626 million and 16.49 million in 2025, an increase of 29% and 28.2% year-on-year respectively. Among them, the proportion of sales of high-end new energy models with a price of more than 300,000 yuan will continue to increase. Li Auto, Tesla, Mercedes-Benz EQ and other brands together constitute the competitive pattern of the high-end new energy market ^[1]. Compared with traditional fuel vehicles, new energy vehicles are equipped with core components such as three-electric systems and intelligent network systems. The fault form and rescue logic have undergone essential changes, which puts forward higher requirements for the technical threshold, safety standards and response efficiency of emergency rescue.

Emergency rescue is the core business with the highest risk and the strongest timeliness requirements in the automobile after-sales system. It covers road rescue, emergency energy replenishment, fault on-site disposal, vehicle towing and other scenarios. It is the last line of defense to ensure the safety of users’ travel and reduce car anxiety. For high-end users, the quality of rescue directly matches their brand image and consumer trust, which is the core indicator for judging the service ability of high-end brands. At present, most high-end new energy vehicle enterprises take “lifetime free road rescue” and

“exclusive butler service” as their core selling points. However, in the actual operation process, there are frequent problems such as delayed rescue, insufficient professional ability, and non-transparent charges, resulting in the continuous increase in user complaints.

The existing research focuses on the overall framework of the after-sales service of new energy vehicles. There is a relative lack of special research on emergency rescue scenarios in high-end sub-markets, and the service demand characteristics of high-end users, the specificity of rescue technology, and the optimization path of the service system are not in-depth enough^[2]. This article introduces the Service Quality Gap Model as a theoretical framework for analysis^[3]. This model was proposed by Parasuraman and other scholars in 1985, which reduces service quality problems into five types of gaps: management cognitive gaps, service quality standard gaps, service delivery gaps, service communication gaps, and customer expectations and perception gaps. In order to understand the “user expectations and perceptions” in rescue services The “disconnection between the brand commitment and the landing effect” and other issues provide a systematic analysis perspective. Based on the product characteristics and user needs of high-end new energy vehicles, this article systematically analyzes the existing problems and causes of emergency rescue after-sales service in combination with the latest industry data and typical cases, and puts forward a targeted optimization path.

2. Characteristics and Requirements of High-End New Energy Vehicle Emergency Rescue Service

2.1 The Essential Difference from the Traditional Fuel Vehicle Rescue

New energy vehicles have fundamental differences from traditional fuel vehicles in terms of power system, electrical architecture, intelligent configuration, etc. These differences directly determine the special requirements of emergency rescue services. First, the safety risk of high-voltage electricity. New energy vehicles are equipped with a high-voltage power battery system, and the voltage usually reaches more than 300V. Improper rescue operation may cause serious safety accidents such as electric shock, short circuit and even battery thermal runaway. Rescuers are required to have high-voltage electrical safety knowledge and standardized operation ability. The second is the peculiarity of the fault type. New energy vehicles mainly involve battery management system, motor controller, on-board charging system and other core three-electric components, as well as complex software system problems. The diagnosis and preliminary disposal of such faults far exceed the scope of traditional fuel vehicle rescue capabilities. Third, the new possibility of rescue brought by intelligent network connection. New energy vehicles are generally equipped with remote diagnosis, vehicle-computer emergency call system, cloud warning and other functions, which provides technical conditions for accurate prediction before rescue and remote support during rescue.

2.2 Special Requirements for High-End Users

The high-end new energy vehicle user group has distinct characteristics and puts forward higher requirements for emergency rescue services. First, the time limit requirements are extremely high. The time cost of high-end users is high, and the tolerance for waiting is extremely low. The experience of the owner of the ideal car waiting for the rescue for “half a day” after the tire leaks will directly affect their trust in the brand. Second, the professional requirements are strict. High-end users have a high ability to distinguish the professional level of service personnel. Whether rescuers can accurately judge faults, standardize operations, and give professional advice directly affects users’ perception of the technical strength of the brand. Third, the sense of experience is fine. From the customer service speech when calling for help, to the transparency of information during the rescue process, to the closed-loop follow-up after the rescue, each contact point is shaping the user’s brand perception.

2.3 Emergency Rescue Service Process Node

A complete emergency rescue service normally has six key steps. First, the user makes a distress call. The call must be answered quickly. The agent should write down the user’s information accurately and help calm the user down. Second, the agent confirms the user’s location, checks the vehicle’s condition, and finds out what type of fault has occurred. If the information is correct, the rest of the process goes more smoothly. Third, the system dispatches a rescue team. It matches the user’s needs with nearby resources and makes the best decision. Fourth, the team arrives on site and handles the problem.

The user's overall impression of the service largely depends on how well the team performs, how clearly they communicate, and how properly they fix the issue. Fifth, if the vehicle cannot be fixed on site, it needs to be towed. This must be done quickly and safely, making sure both the vehicle and the people involved are well protected. Sixth, after the rescue, the service provider should follow up. They should inform the user about the repair progress and address any remaining concerns. These six steps are closely connected. If any one of them goes wrong, the whole service chain breaks down, which hurts user satisfaction and brand loyalty.

3. Existing Core Issues of High-End New Energy Vehicle Emergency Rescue After-Sales Service

3.1 The Layout of the Service Network Is Unbalanced, and the Response Time Limit Is Difficult to Guarantee

The layout structure of high-end new energy vehicle rescue service is unbalanced, the service resources are concentrated in the first and second tier cities, and the network coverage in the third and fourth tier cities and county areas is insufficient. The service center of the new force 's head car companies is mainly concentrated in provincial capitals and economically developed areas. The sinking market relies more on third-party cooperation agencies to carry out rescue work, and there is a general shortage of rescue vehicles and insufficient allocation of technical personnel. This imbalance directly leads to a significant extension of the rescue response time in remote areas and suburban road sections. The waiting time of users at night or in remote areas can reach more than 5 hours, which is a huge gap with the rescue waiting time promised by high-end brands. The contradiction between supply and demand of rescue is particularly prominent in scenarios such as holiday travel peaks, extreme weather and high-speed road sections. During the holidays of 2025, the demand for fault rescue of new energy vehicles increased significantly year-on-year, and the proportion of night rescue was more than half. Many service outlets were forced to start the all-weather service mode. According to the data of the Road Network Monitoring and Emergency Disposal Center of the Ministry of Transportation, the traffic flow of new energy vehicles on expressways continues to rise during the National Day holiday in 2025. On October 1 and 2, the country reached 13.287 million and 12.367 million respectively. However, the high-speed rescue resources are limited by road administration and site layout, and the deployment flexibility and service network coverage are insufficient. It is difficult for high-end brand exclusive rescue vehicles to quickly enter the high-speed road section for disposal, and the cross-regional rescue efficiency is low, further prolonging the rescue cycle and exacerbating the user 's car anxiety.

3.2 Professional Rescue Ability Is Insufficient, and Technical Adaptability Is Short

The rescue of new energy vehicles involves high-voltage safety, three-electric system diagnosis, battery thermal runaway disposal, intelligent driving sensors and other fields. There are essential differences from traditional fuel vehicles, but the current industry's specialization level is seriously lagging behind. On the one hand, there is a huge shortage of professional talents. There are less than 100,000 licensed new energy maintenance technicians nationwide, and there is a shortage of about 842,000 after-sales service talents^[4]. Accounting for 80% of the talent gap in the auto repair industry, rescue technicians with high-voltage system operation qualifications and those who can independently complete the preliminary diagnosis of three-electric faults are more scarce, and only about 1/4 of the maintenance personnel can be competent in battery testing and maintenance work^[4]. Most third-party rescuers have insufficient understanding of the high-voltage architecture and battery management system, and still follow the traditional fuel vehicle technology, which is easy to cause secondary damage and even safety accidents. On the other hand, the adaptability of rescue technology and equipment is insufficient. Flat-bed trailers, insulation testing equipment, mobile supplementary trams and other professional equipment suitable for new energy models are insufficient. The on-board remote diagnosis system fails to effectively communicate with the rescue dispatch system, and the faulty vehicles can only rely on trailer transshipment, which makes it difficult to achieve rapid disposal. At the same time, the OEM strictly controls the maintenance authority of the three-electric system. External rescue agencies cannot read the core fault code or perform software reset. A large number of non-hardware failures still need to be trailered back to the factory, which greatly reduces the rescue efficiency.

3.3 Service Standards Are Not Uniform, and Transparency and Normativeness Are Lacking

Emergency rescue involves many subjects such as customer service centers, rescue service providers, maintenance stores, etc. The smoothness of information sharing and process coordination directly affects the overall service quality. At present, high-end new energy vehicle rescue services lack unified industry grading standards, and the terms of service of each brand are formulated on their own, which is easy to fall into the controversy of “propaganda and reality”. First, the boundary of free rights and interests is vague. Most brands only promote “free road rescue”, but the key information such as the calculation method of free mileage, the definition of remote areas, and the exemption situation is vague. Second, the standard fee is not transparent, and the pricing of rescue services beyond the free scope lacks a unified basis. In some scenarios, there are problems such as on-site price increases and hidden charges. Third, the rescue operation process is not standardized. High-voltage rescue does not strictly implement safety processes such as power-off inspection and insulation protection. Fault records and service certificates are missing. Once a safety accident or vehicle is damaged, it is difficult to define responsibility, and the user’s rights protection cost is high.

3.4 Insufficient Intelligent Empowerment and Weak Active Rescue Ability

Intelligent networking should be the core advantage of new energy vehicle rescue, but at present, the intelligent rescue of most high-end brands is still in the primary stage. First, the depth of remote diagnosis application is insufficient. Most car models can only realize basic fault code reporting, and cannot complete accurate fault location and remote repair. A large number of software faults and system misreports still need to be dealt with on the spot, resulting in a waste of rescue resources. In 2025, automatic rescue work orders actively triggered by on-board terminals accounted for only 12.1% of the total number of work orders. Second, the intelligent scheduling ability is uneven. Some brands still use manual dispatch mode, and do not access real-time road conditions, network production capacity, technician status and other data, and cannot achieve optimal resource matching. Third, the ability of active early warning and preventive rescue is weak. The early warning and rescue systems have not been opened yet. Most of the early warnings are only pushed to the user side. The rescue response mechanism is not triggered synchronously, and it is difficult to achieve risk advance intervention.

3.5 Insufficient User Experience, Lack of Information Barriers and Humanities

Emergency rescue is not only a simple technical guarantee service, but also an emotional service with humanistic attributes. At present, the problems at the experience level are also prominent. First, the information transparency of the whole process of rescue is insufficient. After the user initiates the rescue request, it is difficult to obtain the departure time of the rescue vehicle, the expected arrival time, the information of the service personnel and other key contents, and the uncertainty of the information further aggravates the user’s psychological anxiety. Second, the ability of customer service staff to sympathetic and appease in emergency situations is insufficient. Many customer service response modes are mechanically solidified, mostly programmatic speech, and lack perception of users’ emotions and targeted appeasement. The lack of emotional care will significantly reduce the service satisfaction of high-end customers, thereby weakening users’ loyalty to the brand.

4. Deep Causes of High-End New Energy Vehicle Rescue Service Problems

4.1 The Pace of Industrial Development Is Mismatched, and the Construction of the After-Sales System Is Lagging Behind

The sales of new energy vehicles are growing rapidly, but the follow-up of the after-sales system is insufficient, and there is a phenomenon of “heavy sales and light after-sales” in the industry. Most car companies regard emergency rescue as an “ancillary function” rather than a “core value” of after-sales service, and lack differentiated rescue standards for high-end brands at the strategic level. Jundi, a world-renowned market research institution (J.D. Power) released the research results of the satisfaction of China’s new energy vehicle after-sales service. In 2025, the overall satisfaction score of China’s new energy vehicle after-sales service is 775 points (1000 points). From the perspective of the brand camp, the satisfaction scores of luxury, mainstream and independent brands are 776 points, 775 points and 7 respectively. 74 points, which has become a glued posture. NIO ranks first as a luxury brand with 801 points, Mercedes-Benz ranks second with 783 points, and Ideal ranks first as a mainstream brand with 788 points. Although there is a gap between the head brand and the ordinary brand, the overall score of the three camps is very close, which shows that high-end brands have failed to achieve effective separation through service ^[5].

Table 1: Satisfaction score of after-sales service of new energy vehicles in China in 2025

Brand Segment	Score (out of 1,000)	Leading Brand Scores
Luxury Brand Average	776	NIO 801, Mercedes-Benz 783
Mass-Market Brand Average	775	Li Auto 788
Domestic Brand Average	774	
Industry Overall Average	775	

Data source: China Quality News

4.2 Technical Barriers form a Monopoly, and the Participation of Third Parties Is Low

The underlying data, diagnostic permissions and original parts resources of the high-end new energy vehicle three-electric system have been controlled by the OEM for a long time, forming a natural technical barrier. Due to the consideration of the risk control of vehicle quality guarantee, data security protection and after-sales service profit layout, OEMs generally adopt a closed strategy and strictly restrict the opening of diagnostic authorization and parts circulation channels to socialized rescue institutions. The lack of a technical authorization mechanism directly restricts the capacity cultivation of third-party rescue institutions, and it is difficult to form a large-scale and professional socialized rescue force. On the one hand, the self-built rescue network of automobile enterprises cannot achieve full coverage due to cost constraints. On the other hand, third-party institutions lack technical support and it is difficult to undertake difficult scenarios such as high-voltage rescue and preliminary diagnosis of three-power. Finally, it forms an industry dilemma of mismatching supply and demand, which becomes an important institutional reason for restricting the quality and expansion of rescue services.

4.3 The Problem of Data Isolation Is Prominent, and the Degree of Intelligence of Rescue Is Insufficient

The fragmentation of the internal business system of automobile enterprises is the root cause that hinders the progress of intelligent rescue. Remote diagnosis, customer service and rescue dispatch belong to different business modules. There is a lack of a unified data platform, and information transmission depends on manual transmission. It is difficult to achieve data sharing, forming a typical data island. At the same time, most car companies give priority to the layout of front-end functions such as cockpits and autonomous driving. They do not pay enough attention to the back-end rescue dispatching system and lack intelligent dispatching algorithms that integrate road conditions, resources and fault types. The advantages of remote diagnosis cannot be transformed into the advantages of rescue efficiency. Rescue dispatches rely on manual operation for a long time, and resource allocation and rationality are insufficient. It is difficult to match the requirements of high-end users for rescue timeliness.

4.4 The Construction of the Standard System Is Lagging behind, and the Regulatory Restraint Mechanism Is in a Lack

Although the national standard for new energy rescue has been introduced, it focuses on basic operation norms and lacks graded service standards and evaluation systems for high-end markets. The assessment of rescue services by most brands is limited to the level of “whether the rescue has been completed”, and lacks systematic monitoring of detailed indicators such as response time, one-time resolution rate and user satisfaction. At the same time, the industry supervision and disciplinary mechanism is not perfect, the market access threshold is low, and a large number of institutions without new energy rescue capabilities undertake business, and the stability of service quality is difficult to guarantee. In addition, high-end new energy rescue service is an emerging industry. The relevant supporting rules such as the division of powers and responsibilities, insurance claims settlement, dispute handling, etc. have not been perfected, and the rights and interests of users lack institutional protection.

4.5 The Profit Model Is Not Mature, and the Motivation for Service Investment Is Insufficient

Emergency rescue services have the characteristics of high cost and low frequency. High-end exclusive rescue invests hugely in personnel, equipment and outlets, but most brands bundle and sell them as free value-added services, lacking independent profit paths. In the self-operated mode, the operating cost of a single outlet is high and the utilization rate is low, and it is difficult for the sinking market outlets to break even; in the outsourcing mode, service providers often reduce the standards of personnel and equipment in order to compress costs, resulting in a decline in service quality. The ambiguity of the profit model makes car companies and service providers lack the motivation to continuously improve service quality, and the

construction of the service system falls into the dilemma of “large investment and low return”.

5. High-End New Energy Vehicle Emergency Rescue After-Sales Service Optimization Path

5.1 Build a Hierarchical Rescue Network for the Whole Area and Optimize the Layout of Resource Space

High-end car companies should establish a graded response mechanism to divide the rescue level according to the type of fault and the degree of urgency: priority scheduling of high-risk scenarios such as battery thermal runaway warning and high-speed accidents; response to routine faults such as tire leakage and power exhaustion according to the standard process. For example, the cloud early warning and disposal program built by Ideal Automobile for the risk of coolant leakage is a useful exploration of the graded response mechanism. At the same time, cooperate with third-party service providers with new energy rescue qualifications to establish cooperative outlets through technical output, standard output and training and empowerment to fill the market gap; cooperate with high-speed road administration and service area operators to set up rescue stations and emergency energy replenishment facilities in key road sections to solve the difficulties of high-speed rescue on holidays. Question. Finally, an intelligent dispatching system is introduced. According to vehicle location, road condition information, rescue resource distribution and other data, path optimization and resource matching are realized through algorithms, which effectively shortens the rescue response time.

5.2 Strengthen Professional Capacity Building and Break through the Bottleneck of Technical Adaptation

First, to improve the talent training system, automobile enterprises should work with vocational colleges and universities and industry associations to establish new energy rescue talent training standards, open special courses such as high-voltage safety operation, three-electric system diagnosis, battery emergency disposal, etc., and implement the licensed on-the-job system. Carry out normalized technical training and assessment for rescue personnel of cooperative service providers. The second is to speed up the upgrading of rescue equipment. New energy rescue outlets need to be equipped with flatbed trailers, insulation testing tools, high-voltage power-off equipment, mobile replacement trams and other professional equipment. The third is to strengthen the special training of customer service emergency situation speech skills, and design special communication speech skills and emotional appeasement skills. Fourth, moderately open up technical authorization. Under the premise of ensuring the security of vehicle data and the stability of the quality assurance system, open the basic fault diagnosis authority to authorized third-party institutions to a limited extent, compile a unified rescue operation manual for high-end new energy models, and clarify the rescue process and safety specifications of each brand, different fault types and multi-scenarios.

5.3 Improve the Standards and Supervision System to Improve the Transparency of Service Standards

To advance the industry, clear classification standards should be established for premium NEV rescue services. These standards should define different service levels based on key factors: service capacity, response time, equipment configuration, and staff qualifications. Each level must specify the services included, applicable charges, and performance metrics ^[6]. Car companies should also make their service terms easier to understand. They need to clearly state important details in their service agreements, such as free rescue mileage calculation, definitions of remote areas, and exemption clauses. This helps prevent misleading advertising and hidden charges.

5.4 Deepen the Empowerment of Intelligent Technology and Build an Active Rescue System

Give full play to the advantages of intelligent network technology of new energy vehicles, and build an online whole process intelligent rescue system. The first is to open up the vehicle-side data and rescue platform to achieve automatic fault code analysis and remote repair capabilities, and reduce unnecessary on-site rescue. The second is to build an intelligent scheduling system, which integrates GPS positioning, real-time road conditions, network capacity, technician status and other multi-source data to improve the efficiency of resource matching. The third is to link the early warning functions such as battery thermal runaway and electronic control system failure with the rescue system to achieve risk prevention in advance. At the same time, a client-side visual service platform is developed to realize the real-time check of the whole rescue process and eliminate information barriers. The fourth is to establish an active return visit mechanism 72 hours after rescue, confirm the

feedback of vehicle maintenance progress and service experience, and form a complete service closed loop.

5.5 Innovative Services and Profit Models to Achieve Sustainable Development

High-end car companies should break out of the single model of “free bundling” and launch layered and differentiated rescue service products. Provide standardized free rescue services for basic users, and launch exclusive rescue value-added packages for high-end users, including priority response, spare car guarantee, full-process butler docking, off-site rescue accommodation subsidies and other high-end rights and interests. Explore the integrated model of “insurance + rescue + maintenance”, cooperate with insurance companies in depth, integrate high-end rescue services into the vehicle insurance value-added system, and dilute operating costs. In addition, it extends the value chain of rescue services, connects emergency rescue with vehicle repair, maintenance, second-hand cars and other businesses, builds a closed loop of users’ whole life cycle services, and realizes the transformation from “cost center” to “value center”.

6. Research Conclusions and Prospects

The emergency rescue after-sales service of high-end new energy vehicles is an important bottom support for the high-quality development of the automobile industry, and it is also the key to shaping the core competitiveness of high-end vehicle enterprises. At present, China’s high-end new energy vehicle rescue services are in a critical period of transition from scale to quality. Problems such as unbalanced service network, weak professional ability, lack of standard system, lagging intelligent services, and inadequate protection of rights and interests have seriously hindered the upgrading of the quality of rescue services. With the theoretical support of the service quality gap model, this article systematically analyzes the development dilemma faced by emergency rescue from five dimensions, and deeply explores its deep causes. Research shows that improving the quality and efficiency of rescue services requires multi-party efforts from automobile enterprises, industries and regulatory departments to promote rescue services from “passive response” to “active” by building a hierarchical service network in the whole area, strengthening professional and technical capabilities, improving the industry standard supervision system, deepening intelligent empowerment, and innovating service profit models. “Prevention”, upgrade from “basic guarantee” to “quality experience”. In the future, with the continuous iteration of intelligent network technology and the continuous improvement of industry standards, high-end new energy vehicle emergency rescue services will be deeply developed in the direction of intelligence, specialization and ecology. New technologies such as active early warning and remote disposal will be gradually implemented, and rescue services will no longer be limited to fault disposal, but will be integrated into the user’s full travel scenario, becoming the core component of the high-end car brand service ecology. Continuously optimizing the emergency rescue after-sales service system can not only effectively reduce users’ anxiety about using cars and improve brand reputation, but also build after-sales support for the high-end development of China’s new energy vehicle industry.

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