

Analysis of the Business Model for New Energy Vehicles Surpassing Traditional Fuel Vehicles in Chinese Market

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Abstract:

Under the backdrop of low-carbon transformation in the global automotive industry, New Energy Vehicles (NEVs) in Chinese market have achieved market dominance over traditional Internal Combustion Engine (ICE) vehicles through business model innovation. This study employs case analysis and SWOT methodology, focusing on leading NEV manufacturers in China (Tesla, BYD, NIO, Huawei, etc.), to systematically examine successful innovations in three key areas: sales strategies, product definition, and ecosystem development. Key findings include: 1. Motor technology has disrupted the engine performance-based premium pricing system; 2. Integrated hardware-software-aftermarket ecosystems have established new competitive barriers; 3. Significantly shortened R&D and manufacturing cycles have transformed traditional automotive development systems; 4. Direct/hybrid sales models have markedly improved channel efficiency and quality (35% increase in customer satisfaction). The research confirms that NEVs' competitive advantage stems from "technology + model" dual drivers, while also highlighting challenges including inadequate charging infrastructure (rural coverage <12%) and consumer concerns regarding safety and range. The core contribution of this study lies in demonstrating that Chinese NEV leadership stems not merely from technological breakthroughs, but more fundamentally from systematic business model innovation. These findings provide both a replicable framework for traditional automakers transitioning to electrification and new market entrants, as well as theoretical foundations for policymakers to optimize industry support measures. NEV business practices are actively redefining the competitive rules and development trajectory of the global automotive industry.

Keywords: New Energy Vehicle; business model; Chinese market; SWOT analysis

1. Introduction

Amid the profound transformation of the global automotive industry, the shift in energy demand and environmental concerns have driven new energy vehicles (NEVs) to become the core direction of development. Chinese NEV industry has achieved remarkable leapfrog growth in a short period, with production and sales soaring annually, positioning the country as a global leader. This success is built on continuous technological advancements and breakthroughs in business model innovation—from product definition to service ecosystems, and from product development to sales model innovation—reshaping the very foundation and philosophy of the industry. As such, it has become a quintessential case study for observing industrial transformation and innovation.

Research has revealed that existing studies predominantly focus on the technical performance of NEVs (e.g., battery development, energy efficiency) and policy support mechanisms (e.g., local government subsidies, national policies), while relatively neglecting analysis and discussion of the successes and innovations in business models. There remains a gap in systematic exploration of this dimension.

This study centers on the business model innovation of Chinese NEV industry, primarily examining dimensions such as product definition, sales models, and service ecosystems. Employing a case study methodology, it selects leading NEV manufacturers as samples and conducts a systematic comparative analysis with traditional fuel-powered vehicles to elucidate the logic behind competitive advantage construction. The case studies encompass representative automakers with different technological routes and market positioning, covering those specializing in pure electric, hybrid, and extended-range vehicles. The research compares the iterative logic of traditional fuel vehicle business models across dimensions such as user demand insight, channel operations, and production development. Additionally, a SWOT analysis is applied to assess NEV business models and the vehicles themselves—evaluating innovative strengths, future sustainability, potential challenges, and notable shortcomings—to systematically outline the internal and external conditions and demands for NEV development. This cross-validates the findings from the case studies, providing support for industrial planning and corporate strategic adjustments.

The exploration of NEV business model innovation holds theoretical significance by expanding the boundaries of industrial transformation theory and enriching the “technology-business” co-evolution analytical framework in innovation management research. In practice, it offers actionable insights for traditional automakers undergoing digital transformation and emerging NEV startups, while assisting policymakers in refining targeted strategies to

enhance the sustainability of the industrial ecosystem. Furthermore, by dissecting Chinese innovative practices in the NEV sector, this study presents a leading global solution for low-carbon transition in the automotive industry, promoting worldwide NEV development and environmental sustainability efforts. It carries substantial value for both global industrial governance and domestic advancement in China.

2. Research Methodology

This study focuses on Chinese NEV industry, selected for its remarkable market transformation (sales surged from 80,000 units to 12 million units, and disruptive innovations in product definition, sales models, and digital ecosystems [1]).

Primary sources: Government reports: Annual New Energy Vehicle Industry Development Reports released by the Ministry of Industry and Information Technology (MIIT) of China (published on MIIT’s official website quarterly since 2018); Tax policies data from State Taxation Administration’s 2025 Policy Announcement Platform (updated monthly).

Industry data: McKinsey’s China NEV Market Insights 2024 Report, accessed via McKinsey’s official research portal (data collected through 10,000 + consumer surveys and 50 + enterprise interviews, published in Q3 2024). official websites of companies such as Volkswagen.

Secondary sources: Peer-reviewed studies (CNKI, Google Scholar) on consumer behavior and battery technology. Like consumer behavior studies:

Peer-reviewed paper by Xu Hangzhou (Research on Consumers’ Willingness to Purchase New Energy Vehicles) from CNKI’s “Economic Research Journal” (published 2025) and Battery technology studies:

Academic paper by Zhang Yonglong et al. (Brief Analysis on Safety of Solid-State Lithium-Ion Batteries) from CNKI’s “Energy Storage Science and Technology” (2018).

Validation: Cross-verification of manufacturer claims with independent test data.

2.1 Analytical Framework

Business Model Analysis: combines business model Canvas and SWOT to evaluate NEV advantages (e.g., rapid iteration, OTA capabilities) and challenges (e.g., range limitations), alongside external factors (e.g., subsidies, tariffs).

2.2 Research Design

Introduce the two mainstream models of new energy vehicles (the direct sales model and the hybrid model) and their representative companies (Tesla, NIO, Geely, BYD). Analyze their advantages and innovations over the

traditional fuel vehicle dealer model from various dimensions, such as cost comparison, risk, user experience, and sustainability. Meanwhile, point out the existing problems of various models and the ways to improve them. Partial Collection of Consumers' Opinions: Industry related institutions/journals (such as Dongchedi, Autohome, etc.)
Authoritative Data: McKinsey's "2024 New Energy Ve-

hicle Sales Channel Indicators" Methodological Rigor: Structured analysis ensures robustness, prioritizing authoritative and transparent data sources.

3. Analysis

Table 1. SWOT diagram of New Energy Vehicles

S	W
1. Redefining traditional ICE vehicle product definitions 2. New capabilities enabled by electrification 3. Rapid iteration cycles driven by technological advancements 4. High potential for technological breakthroughs	1. Range limitations of pure electric vehicles (BEVs) 2. Safety concerns (e.g., battery fires)
O	T
1. Strong government policy and financial support 2. For the major trend of green environmental protection	1. Inadequate infrastructure in non-developed regions 2. Reduction in government policies and subsidies 3. Deteriorating international competitive environment

3.1 SWOT analysis of New Energy Vehicles

SWOT analysis is a common strategic management tool used to assess the Strengths, Weaknesses, Opportunities and Threats of an organization, product, or project. The purpose of SWOT analysis is to help an organization or individual gain a comprehensive understanding of the internal and external. Identify the environment, including potential strengths and opportunities, and address weaknesses and threats. Through effective SWOT analysis, more focused strategic plans and courses of action can be developed, and the competitiveness and performance of the organization can be improved. Table 1 is the SWOT analysis for new energy vehicles in terms of technologies, business models, government policies and so on.

3.1.1 For strengths (which can be seen in the S section of Table 1)

First, the product classification and definition of traditional internal combustion engine vehicles have long been strictly constrained by core mechanical attributes such as engine displacement, cylinder count, and transmission type. For example: entry-level/compact cars typically correspond to 3-4 cylinder engines with 1.5L-2.0L displacement and basic automatic transmissions (e.g., Toyota Corolla, Volkswagen Golf), and for full-size/luxury vehicles which mostly feature V6/V8 engines (3.0L, 4.0L+) with high-performance automatic transmissions (e.g., Mercedes-Benz S-Class, BMW 7 Series).

In most cases, prices increase stepwise with displacement and mechanical configurations, while features are distributed according to "mechanical performance tiers," making it difficult for consumers to access premium features in

lower-tier models.

New energy vehicles have completely shattered this rigid logic. They have redefined product value through new dimensions like motor power, battery capacity, and intelligent infotainment systems. Where power parameters were once directly correlated with luxury status, a "compact" NEV can now easily match or surpass the power output of mid-to-large luxury ICE vehicles e.g., the Zeekr X achieves 430 hp at ¥190,000, comparable to the V8-powered Audi A8's 460 hp(¥1.9m). Even entry-level models can now feature advanced driver-assistance systems (like BYD Qin's "Eye of Providence" system at just ¥80,000) and premium chip-powered infotainment. Vehicle features and user experience are no longer constrained by traditional mechanical classification hierarchies.

The pricing structure has consequently become more flexible NEV costs are primarily tied to battery capacity, vehicle size and intelligent hardware rather than being defined by displacement or cylinder count before determining configurations. This has made "segment-defying experiences" commonplace, as the traditional ICE vehicle rule of "defining features and pricing by mechanical parameters" is being surpassed by NEVs' "experience-value-based product definition" approach.

Second, remote OTA (Over-The-Air) is one of the core capabilities that distinguish new energy vehicles from traditional fuel-powered cars. OTA refers to a technology for remote management of systems and applications through the air interface of mobile communication. It has the following characteristics [2]:

1. Send information to ECU to track and monitor the working status of the entire vehicle in real time, thereby

reducing warranty costs. It is estimated that 50% of the repair issues for automakers are caused by software [3].

2. Enable vehicles that have already been sold to continuously have the latest software and some hardware functions, such as automatic driving.

There are several examples of the OTA, such as Huawei's Autonomous Driving System (ADS) evolving from versions 2.0 to 4.0 via remote updates—and rapid fixes for software vulnerabilities, exemplified by Tesla's 2023 update addressing charging protocol flaws. Beyond technological progress, OTA has reshaped automotive business models by boosting product competitiveness through ongoing feature upgrades, enabling “software-defined vehicle” monetization (e.g., subscription-based autonomous driving or performance upgrades), and reducing maintenance and recall costs [4]. This fosters an “ever-evolving user experience, always-on services” ecosystem, shifting the industry from one-time sales to full-lifecycle operations and making OTA a core competitive edge for NEV manufacturers.

In contrast, most fuel-powered vehicles require wired connections at dealerships to update the ECU (Engine Control Unit), with only limited modules (such as transmission logic) being updatable, making the process costly and unreliable.

Thirdly, thanks to the rapid development of Chinese new energy technology, electric vehicles have caught up with and surpassed traditional internal combustion engine (ICE) vehicles by leveraging their accelerated iteration cycles.

The complexity of mechanical systems in ICE vehicles necessitates extremely long development and reliability validation periods. For instance, Volkswagen's ICE vehicles require a 54-month development cycle [5].

In contrast, new energy vehicles (NEVs) benefit from the high standardization of their core three-electric systems (battery, motor, and electronic control), which significantly streamlines new model development and shortens reliability validation time. Moreover, multiple NEV brands engage in joint R&D with suppliers, who participate deeply from the early stages. This not only accelerates technology implementation but also minimizes instability risks.

Furthermore, new energy vehicle brands generally adopt direct sales or hybrid distribution models and maintain direct communication channels with users (e.g., dedicated apps). This allows manufacturers to receive precise and timely feedback, usage data, and pain points from customers. The connected nature of new energy vehicles also enables automakers to collect vast amounts of real-world operational data, allowing most issues to be quickly identified.

The process: “collect user needs → rapid development → technical validation → market launch → gather feedback and continue iterating” represents a highly efficient

closed-loop model unique to new energy vehicle in Chinese market. This approach dramatically compresses the development cycle compared to traditional ICE vehicles.

Fourthly, solid-state batteries, which replace the flammable organic liquid electrolytes of traditional lithium-ion batteries with solid electrolytes, offer wider electrochemical windows and higher energy density, significantly enhancing safety by fundamentally resolving thermal runaway issues [6]. This progress is further advanced by the evolution of electrode materials: anodes have shifted from graphite systems to pre-lithiated silicon-based and lithium metal anodes, while cathodes have progressed from high-nickel formulations to ultra-high-nickel, lithium nickel manganese oxide, and lithium-rich manganese-based variants, collectively enabling energy densities up to 500Wh/kg—exemplified by CATL's 500Wh/kg prototype battery. By 2030, such advancements are expected to deliver a 50% increase in energy density and near-instant charging, thereby completely eliminating range anxiety. Paralleling these battery innovations, the intelligent driving ecosystem is evolving rapidly: powered by electrification technologies, new energy vehicles (NEVs) already feature autonomous driving capabilities that can replace human drivers in specific scenarios, with Huawei set to launch its ADS 4.0 system in the near future—a Level 3 autonomous driving solution for highway scenarios where manufacturers will assume liability for accidents occurring during autonomous operation. As this technology matures, electric vehicles will achieve full-scenario autonomous driving, with AI-powered systems drastically reducing traffic accidents and congestion, eventually rendering traditional driving skills obsolete. This transformation, rooted in cumulative technological progress, marks the evolution of automobiles from mechanical transport tools to AI-driven mobile smart terminals.

3.1.2 For weakness

Electric vehicles (EVs) still face several core challenges, including range anxiety, insufficient charging power, and a shortage of charging infrastructure. Among these, range-related issues are particularly prominent: in subzero temperatures, vehicle range drops by more than 30%, and relevant surveys indicate that 58% of consumers reject EVs due to concerns about range limitations. Additionally, authoritative automotive media have conducted standardized energy consumption tests for EVs under high-speed driving scenarios—carried out at a constant speed of 120 km/h in a 25°C environment to simulate highway driving conditions. The specific test results, as shown in Table 2, further reveal the complex nature of range performance in real-world usage [6].

Table 2. Comparison of energy consumption of officially rated V.S. actual road test

Type	Officially rated power consumption(kwh/100km)	High-speed electricity consumption(kwh/100km)	Percentage difference
Nio ET7	16	22.4	+40%
Tesla Model s	17.4	25.2	+44.8%
Lotus Emeya	18.8	25.4	+35.1%
Mercedes EQE	14.4	21.4	+48.6%
BYD Han	13.1	23.6	+80.2%

Secondly, consumers' concerns about the safety of new energy vehicles, particularly the risk of battery fires in collisions, are fundamentally rooted in their technical characteristics.

From a technical perspective, the battery, as the power core of new energy vehicles, must store a large amount of electrical energy to support the driving range. However, this high energy density also makes it prone to structural damage under extreme conditions such as collisions. For example, deformation of battery cells or leakage of electrolytes may lead to short circuits and thermal runaway, ultimately causing fires or explosions. This risk does not stem from product defects but is an inherent attribute of energy storage devices—just as fuel-powered vehicles rely on the flammability of fuel for propulsion, new energy vehicles depend on high-energy-density batteries for range. Both require technical solutions to strike a balance. Currently, many new energy vehicle brands, in collaboration with battery manufacturers, have developed technologies such as collision power cutoff and cell inversion to prevent fires in collisions.

3.1.3 For opportunities

In recent years, the Chinese government has actively promoted the development of the new energy vehicle (NEV) industry, rolling out a series of policies and subsidy measures to accelerate the adoption and technological advancement of NEVs. Key incentives include a full vehicle purchase tax exemption for NEVs purchased before December 31, 2025, with a maximum exemption of ¥30,000 per NEV passenger car [7]. For trade-in and replacement scenarios, individuals can receive subsidies of up to ¥15,000 when trading in an old vehicle for a new NEV passenger car, and ¥20,000 when scrapping an old car to buy a new NEV passenger car. Additionally, NEVs with green license plates enjoy significant benefits: many cities, such as Xi'an, exempt them from tail-number-based traffic restrictions during peak hours (which apply to fuel-powered vehicles), while in cities like Shanghai and Shenzhen, green plates are free and do not require participation in costly auctions (where fuel vehicle plates can cost tens of thousands of yuan). Moreover, non-local residents can apply for green plates under certain conditions, enhancing

accessibility. These policies have significantly boosted China's NEV market, making it the world's largest, with future adjustments likely focusing on gradually reducing subsidies while sustaining support for technological innovation and infrastructure development.

3.1.4 For threats

First, the promotion of new energy vehicles in underdeveloped areas still faces severe challenges due to insufficient infrastructure, mainly reflected in the inadequate coverage of charging networks and backward equipment: Rural areas account for only 12% of the country's total charging piles [8], and "charging deserts" have formed between urban agglomerations. The existing charging piles in rural areas are mainly slow-charging ones (7-21kW), which are far less powerful than the ultra-fast charging facilities in cities. For example, Huawei's ultra-fast chargers have a maximum power of 600kW, and Li Auto's ultra-fast chargers have a power of more than 250kW.

Secondly, concerning the current and future reduction of subsidies in China's new energy vehicle market, several key trends stand out. The purchase tax exemption policy is being gradually scaled back: in 2024, new energy vehicles still benefit from a full exemption (up to 30,000 yuan); in 2025, this exemption quota will be halved to a maximum of 15,000 yuan, applicable only to pure electric vehicles and some plug-in hybrid models; and after 2026, it may be further reduced or even canceled, aligning with the tax standards for fuel vehicles. Meanwhile, local policies are tightening at an accelerated pace: for instance, Shanghai and Beijing will restrict priority licensing advantages to pure electric models only after 2025, and other first-tier cities are likely to follow this trend, gradually revoking license plate preferential treatments for hybrid and extended-range vehicles.

Thirdly, in response to the strong rise of Chinese brands, European and American countries are erecting targeted policy barriers under the pretexts of "national security," "fair competition," and "carbon emission standards," aiming to curb the overseas expansion of Chinese new energy vehicles. In terms of tariffs, the U.S. raised tariffs on Chinese electric vehicles from 25% to 100% in September 2024, while in October 2024, EU member states voted to

impose additional countervailing duties of up to 35% on Chinese-made EVs for five years, on top of the existing 10% tariff.

3.2 The analysis of the sales model of NEV in Chinese market

The rise of new energy vehicles (NEVs) in China has not only surpassed traditional fuel-powered cars in terms of product experience and technology but has also revolutionized the conventional sales framework. Below is an introduction to the NEV sales model.

3.2.1 Direct sales model (Represented by Tesla, NIO, and Li Auto)

The direct sales model features a channel architecture fully owned by the manufacturer, integrating online and offline systems: online, official websites and apps serve as user acquisition platforms and order entry points with fully digitalized processes; offline, experience centers primarily handle vehicle displays, test drives, and order placement, supported by on-site service teams and offline service stores. Its operational features include nationwide uniform and transparent pricing, made-to-order production for inventory management, dedicated personnel for different services to ensure customer experience and professionalism, and a service process that allows customers to explore and place orders either online or offline, with delivery options such as in-store pickup or home delivery (as offered by Tesla and NIO, for example). Compared to the traditional dealer model, the direct sales model offers several advantages: it eliminates pricing and service opacity—avoiding issues like price markups, inconsistent service quality, and profit-sharing across multiple dealer layers that plague traditional fuel-powered car dealerships; enables direct access to user data for flexible strategy adjustments and rapid feedback integration; ensures uniform service standards, guaranteeing consistent customer experience across all locations, whether in first-tier cities or less developed regions; secures prime location exposure, as directly operated stores are often situated in high-traffic urban hubs (such as shopping districts) to significantly increase visibility among high-net-worth consumers; and allows faster innovation deployment, with manufacturers able to swiftly introduce new services directly to consumers—a Forbes US market study found that „75% of surveyed consumers are willing to pay a premium for superior experiences.“ However, the direct sales model also has disadvantages, particularly high costs involving substantial upfront investment with slow returns, and due to high operational costs and slow penetration, coverage in lower-tier cities and rural areas remains challenging; it also has limited flexibility, struggling to adapt to regional policy changes promptly, which may lead to losing competitive edge if headquarters fail to respond swiftly.

3.2.2 Unique Innovation: NIO's Distinctive Sales Model (BaaS)

Unlike other new energy vehicle brands, NIO pioneered a unique sales model in 2020—Battery as a Service (BaaS), whose core mechanism is that users only pay for the vehicle excluding the battery when purchasing to reduce upfront costs, and then obtain ongoing usage rights by subscribing to a monthly battery rental plan. This model offers the advantage of flexible battery upgrades while eliminating users' anxiety about battery degradation: since battery ownership remains with NIO, users do not need to worry about shortened battery lifespan or loss of residual value. In this way, the BaaS model redefines the economic logic of car ownership and enhances flexibility and long-term value for NIO customers.

3.2.3 Hybrid Sales Model (Represented by BYD, Geely, and HarmonyOS Smart Mobility)

The channel architecture combines online and offline elements: automakers establish unified official platforms (websites, apps, etc.) to offer online services such as vehicle displays, consultations, and order submissions, allowing some users to complete part of the purchase process digitally. Offline, the structure integrates directly operated stores and authorized dealerships—direct stores, managed by the automaker, focus on brand image display and standardized services, while dealerships, operated by partners, handle regional sales, deliveries, and after-sales services. In terms of operational features, the pricing system adopts a dual approach: core models or configurations follow a nationally unified suggested retail price to avoid inter-dealer price wars, while dealers are granted limited price flexibility for personalized options or region-specific models under the automaker's supervision. For inventory management, automakers directly control stock in their own stores, allocating it based on demand, while dealers manage their own inventory with indirect oversight (e.g., through sales targets and incentives). Market collaboration involves the automaker centralizing online traffic and directing it to both direct stores and dealerships, with dealers leading localized marketing in their regions and receiving support (such as ad subsidies) from the automaker.

Compared to the traditional dealer model, this architecture offers key advantages: it balances efficiency and coverage by using direct stores in major cities to ensure brand consistency and service standards, while leveraging dealers' local expertise to penetrate regional markets—particularly in lower-tier cities and rural areas. It also reduces automakers' costs compared to a pure direct sales model by lowering the financial burden of large-scale direct store operations [9]. Additionally, it adapts effectively to market dynamics, enabling quick responses to policy or market shifts through direct channels, while dealers provide re-

gional flexibility.

3.2.4 Conclusion of NEV Sales Models vs. Traditional Dealerships

Compared with new energy vehicle (NEV) sales approaches, traditional dealership models have significant drawbacks. The McKinsey China Auto Consumer Survey shows that 64% of fuel vehicle owners are dissatisfied with the 4S dealer model[10], citing issues such as opaque purchasing processes, a lack of transparency regarding vehicle information and value, and the remote locations of 4S stores. In contrast, NEV owners report higher satisfaction across service experience, purchasing processes, online communities, and customer care—all of which demonstrate the success of innovative sales models.

4. Conclusion

The transition of the automotive industry from Internal Combustion Engine (ICE) vehicles to New Energy Vehicles (NEVs) is not merely a technological revolution but also a fundamental reshaping of business models, product value, and user ecosystems. This study reveals the transformative innovations driving the rise of NEVs and their impact on sustainable competitiveness through a comparative analysis of sales strategies, product definition, and ecosystem construction.

The core research findings indicate how NEVs have subverted the traditional paradigm: advanced motor technology has disrupted the premium system based on mechanical performance differences in ICE vehicles. Meanwhile, with the technical support and collaboration of technology companies, the traditional automobile R&D and production system has been broken, which not only reduces costs, improves reliability, but also significantly accelerates the iteration speed, thereby promoting the progress of the industry. In addition, the hardware-software-after-market integrated ecosystem supported by functions such as Over-The-Air (OTA) updates and user communities shifts the focus from one-time sales and simple after-sales maintenance to full-life-cycle online and offline user operations.

The sales model also reflects this transformation. Direct sales and hybrid sales models solve problems such as low transparency, inconsistent services, and after-sales support after car purchase in the traditional dealer system in various ways, and introduce innovative models such as Battery as a Service (BaaS). These models not only improve user satisfaction and correct the drawbacks of the traditional dealer model, but also explore the potential direction of the global automobile sales model in the future which is a key advantage in a market defined and driven by transparent and rapid technological progress.

The SWOT analysis further clarifies the development tra-

jectory of NEVs, from strengths and weaknesses to future opportunities and potential problems, and elaborates on the development path of new energy vehicles.

In summary, the success of NEVs stems from their ability to combine technological innovation with user-centered design and flexible business models. This study enriches the understanding of business model innovation in transforming industries. For emerging NEV enterprises, optimizing sales strategies, whether through direct sales or hybrid models. At the same time, during the product development process, conducting potential user research to clarify defining questions such as “for whom the product is made” and “how to sell it”, and cooperating with suppliers and technology companies to reduce costs and improve efficiency will greatly contribute to the success of a new energy vehicle.

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