

Research on NIO's Strategic Layout and Development Path

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ABSTRACT

This paper analyzes NIO's strategic layout and development status during the popularization phase of the new energy vehicle industry, employing a multi-source data triangulation method to conduct an in-depth study from multiple dimensions, including financial performance, technological R&D, product matrix, battery swap network, and global expansion. The research indicates that NIO maintains a leading position in the high-end pure electric market, with its battery swap network and full-stack self-developed technology forming its core competitiveness. However, it also faces challenges such as persistent financial losses, production capacity bottlenecks, and intensified market competition. Based on a SWOT analysis, this paper further reveals the contradictions and risks in its strategic execution and proposes an optimized path to seek a balance between "expansion" and "profitability," providing theoretical references for its sustainable development.

KEYWORDS

NIO; Strategic layout; Financial analysis; SWOT analysis

1. INTRODUCTION

New Energy Vehicles (NEVs) refer to vehicle categories that utilize unconventional vehicle fuels as power sources, integrate advanced technologies in power control and driving, and feature zero or ultra-low emissions. The development of China's new energy vehicle industry spans over 30 years and can be divided into four stages: the incubation period (1992–2006), the introduction period (2007–2016), the growth period (2017–2020), and the popularization period (2021–present) [1]. In recent years, the production and sales of China's new energy vehicle industry have shown significant growth. According to statistics, in 2023, China's new energy vehicle production and sales reached 9.587 million and 9.495 million units, respectively, with year-on-year growth rates of 35.83% and 37.87% [1]. In 2024, new energy vehicle production and sales reached 12.888 million and 12.866 million units, respectively, with year-on-year growth rates of 34.4% and 35.5% [2]. In the first quarter of 2025, new energy vehicle production and sales reached 3.182 million and 3.075 million units, respectively, with year-on-year growth rates of 50.4% and 47.1% [3].

The scale of the new energy vehicle industry continues to expand, with market penetration exceeding 35%. In the high-end intelligent electric vehicle segment, NIO is a typical company that emerged during the popularization period. Founded in Shanghai in 2014, NIO adheres to the brand philosophy of "Creating a Joyful Lifestyle," with innovative technology and user experience as its core competitiveness. It entered the market with battery swap technology, direct sales services, and a high-end positioning, becoming one of the leading companies in China's new energy vehicle sector. In 2018, NIO was listed on the New York Stock Exchange; in 2022, it officially commenced trading on the Hong Kong Stock Exchange; and in the same year, it also began trading on the Singapore Exchange [4].

NIO has launched models such as the ES8, ES6, EC6, ET7, ES7, ET5, EC7, and ET5T, among which the ES6, ET5T, EC6, and ET5 have been particularly well-received in the market. In 2024, NIO's sales reached 200,000 units, and in the first half of 2025, sales exceeded 70,000 units. In the pure electric vehicle market with an average transaction price of over 300,000 RMB, NIO has consistently maintained a leading position, holding the top market share for 23 consecutive months with a market share exceeding 40%. The NIO brand has firmly established itself as a major player in the high-end pure electric vehicle market [6].

This paper employs a multi-source data triangulation method, integrating data from multiple dimensions to ensure scientific and objective analysis. It systematically reviews industry research reports, relevant academic papers, and policy documents related to NIO; conducts data analysis of financial indicators from NIO's 2021–2024 annual reports; quantitatively evaluates various operational data; introduces third-party platform data for cross-validation; and collects in-depth media reports on NIO's strategic partnerships and market expansion. The aim is to discuss the four major strategies implemented by NIO and, while fully affirming the foresight and industry leadership value of its strategies, to focus on analyzing potential contradictions and risks in current strategy execution and propose actionable optimization paths.

2. LITERATURE REVIEW

Wu Jianlong, Hao Mengxiao, and Huang Jing pointed out in their research on the construction of corporate innovation ecosystems in the "Internet+" environment that the key strategy for enterprises to gain innovation advantages lies in building an innovation ecosystem, which is deeply influenced by the "Internet+" environment. The paper proposed a research framework for NIO's construction of an innovation ecosystem in the "Internet+" environment, dividing it into three core subsystems: R&D, manufacturing, and application services. In terms of R&D, NIO focuses on developing technologies such as electric drive systems, battery swapping, and autonomous driving. In manufacturing, NIO adopts modular division of labor and integrates the capability networks of global suppliers. In application services, it relies on NIO Cloud to establish service centers and strengthens the connection between user centers and services through big data technology.

Huang Kangwei, in *A Study on NIO's Marketing Strategy*, noted that NIO, as one of the leading companies in China's new energy vehicle sector, leverages innovative technology and user experience as its core competitive advantages. The study conducted a SWOT analysis of NIO, identifying its strengths in product design and technological innovation, weaknesses in cost pressures due to high investments, opportunities in growing environmental awareness and policy support, and threats from intense industry competition. The study further highlighted issues in NIO's product, pricing, channel, and promotion strategies, proposing corresponding suggestions such as expanding sub-brands, introducing personalized customization, and implementing flexible pricing adjustments [16].

FEV Consulting, in *2024 Automotive Market Performance and Industry Observations*, pointed out that battery swapping is a capital-intensive, long-cycle, and high-investment industry that must improve efficiency through battery standardization. As of 2024, NIO's battery swap stations account for 67.4% of the total number of such stations in China. Currently, major battery swap service providers in the industry can complete the swapping process within 2 minutes, effectively alleviating consumers' energy replenishment anxiety. In terms of battery swap network layout, NIO's battery swap alliance ecosystem includes companies such as Geely, FAW, Changan, GAC, Chery, and JAC. Moreover, NIO's strategic partnership with CATL in 2025 is expected to promote the development of domestic battery swap services and reshape the landscape of China's energy replenishment industry [28].

NIO's core business model revolves around high-end electric vehicles, combined with Battery-as-a-Service (BaaS), direct sales, comprehensive service packages, and community operations. Pisano,

Saba, and Baldovino, in A Critical Review of NIO's Business Model, analyzed the opportunities and challenges NIO faces in the European market. The opportunities include growing demand for electric vehicles in Europe and higher acceptance of subscription models among younger demographics. The challenges include the need to enhance brand recognition, intense competition from established local brands, and delays in the construction of battery swap stations. NIO began its expansion into Europe in 2021, starting from Norway and extending to four countries including Germany. It plans to build 120 battery swap stations in Northern Europe by the end of 2023 and establish an R&D center in Berlin. For the European market, NIO has specifically adjusted its business model by introducing a subscription service: short-term subscriptions allow users to switch vehicles freely, while long-term subscriptions offer a lower fixed price for a single model [20].

In summary, existing literature provides a theoretical foundation for the strategic logic and rationality of NIO's layout from perspectives such as innovation ecosystem construction, marketing strategy, battery swap model, and globalization strategy.

3. ANALYSIS OF STRATEGIC LAYOUT

According to NIO's annual reports from 2021 to 2024, the company exhibits different trends in its solvency, profitability, operational capability, and development capability. Solvency risks have intensified, with short-term borrowings showing significant fluctuations while long-term borrowings have continued to rise, and the asset-liability ratio has increased substantially. Profitability is under pressure; although revenue has maintained growth, the growth rate has slowed down, and the gross profit margin has declined significantly with a slight rebound in 2024, it remains weak. Net loss and net profit margin have continued to deteriorate. Operational capability efficiency has optimized, with collection efficiency significantly improved, inventory turnover days somewhat improved, supply chain management trending positively, total asset turnover ratio increased, and asset utilization efficiency enhanced. Development capability expansion has slowed but potential remains, with revenue maintaining double-digit growth and total assets steadily expanding.

Table 1. NIO's Financial Situation (2021-2024) Part 1

Year	Solvency			Profitability			
	Short-term Borrowings (¥100M)	Long-term Borrowings (¥100M)	Asset-Liability Ratio (%)	Revenue (¥100M)	Gross Margin (%)	Net Loss (¥100M)	Net Profit Margin (%)
2021	72.98	97.39	54.08	361.36	18.88	40.17	-11.12
2022	52.771	108.858	71.28	492.69	10.44	144.37	-29.30
2023	98.215	130.429	74.79	556.18	5.49	207.20	-37.25
2024	57.30	114.41	87.45	657.32	9.88	224.02	-34.08

Data Source: NIO Annual Reports

Table 2. NIO's Financial Situation (2021-2024) Part 2

Year	Operational Capability			Development Capability	
	Accounts Receivable Turnover Days	Inventory Turnover Days	Total Asset Turnover (times)	Revenue Growth Rate (%)	Total Asset Growth Rate (%)
2021	28	26	0.44	122.27	51.68
2022	28	68	0.41	36.34	16.14
2023	31	37	0.47	12.89	17.69
2024	9.3	44	0.61	18.18	20.04

Data Source: NIO Annual Reports

Against the backdrop of weak profitability, the financial pressure NIO faces creates a clear contradiction with its long-term strategic layout. In this context, NIO has proposed and implemented four major strategies: technological breakthrough, product iteration, battery swap network expansion, and global layout. These strategies support and synergize with each other, aiming to break through the current difficulties and enhance long-term competitiveness.

Technology: NIO, guided by user experience and centered on in-house R&D, has built a full-stack technology system covering 12 areas including intelligent driving, smart cockpit, and battery systems. The core of this system includes the self-developed 5nm autonomous driving chip "Shénjī NX9031", the full-domain operating system "Tiānshū SkyOS", and the intelligent chassis. Technology is paramount for building the core competitiveness of the enterprise. The high-end pure electric market is NIO's main battleground, where users have higher demands for technological performance. Core technologies form differentiated barriers. As of June 2024, NIO owned over 9,000 patents and patent applications; the cumulative R&D investment from 2022 to 2024 exceeded ¥33 billion. This R&D investment and patent accumulation not only translate into user-perceivable technological experiences but also, through technological scarcity, consolidate NIO's leading position in the pure electric market above ¥300,000, providing core support for maintaining its premium brand premium even during periods of financial pressure. Externally, the technology strategy aligns with industry trends and policy directions. Fierce competition within the NEV industry forces companies to accelerate innovation. A Canalys report indicates that the penetration rate of L2+ will increase to 9.3% by 2025-2026 [30]. The penetration rate of smart cockpits in the Chinese market has risen to 66% in 2023 and is expected to reach 80% by 2025 [30]. Furthermore, China's *New Energy Vehicle Industry Development Plan (2021-2035)* explicitly requires breaking through the bottleneck of domestic production of automotive-grade chips. NIO's technology roadmap aligns with national strategic direction, enabling it to receive substantial resource support, such as special low-interest loans. This high degree of external alignment not only provides NIO's technology R&D with dual benefits from policy dividends and market demand but also gives it a first-mover advantage in setting industry technology standards, providing a foundation of technical compatibility for other strategies like the battery swap alliance ecosystem and global expansion.

Product: NIO has formed a "pyramid-shaped" brand layout covering diverse markets. The NIO brand targets the high-end market with prices above ¥300,000; the Onvo brand targets the mainstream market, focusing on the ¥200,000-300,000 range; and the Firefly brand enters the premium compact car market with a pre-sale price of ¥148,800. Branding is a key pillar in shaping market competitiveness. Different consumer groups have differentiated demands for brands: the high-end market emphasizes brand value and user experience; the mainstream market emphasizes all-around balance and high cost-performance; the entry-level market emphasizes practicality and extreme cost-performance. Multi-brand coverage broadens NIO's audience and increases the overall sales base. Large-scale fixed costs, including R&D and production investments, can be spread under this strategy, potentially alleviating some financial pressure from new brand development. The current NEV market penetration rate has exceeded 35%, intensifying market stratification. Automakers like BYD and Geely have covered the entire price spectrum through multi-brand matrices, confirming that a layered layout is a viable approach. If NIO were confined only to the market above ¥300,000, it would face the risk of "a visible ceiling in the high-end market and being squeezed out in the mid-to-low-end market." Therefore, NIO's "pyramid" brand strategy is not merely about price coverage but a precise strategy based on its own resources and characteristics, conforming to market trends.

Battery Swap Network: As of August 15, 2025, the total number of battery swap stations nationwide reached 3,452, covering 550 cities. In March 2025, NIO announced the signing of a strategic cooperation agreement with CATL. Through the "dual-network parallel" model implemented in cooperation with CATL, high-end models use exclusive battery swap services, while mid-to-low-end models are compatible with the chocolate battery swap standard. The number of vehicle models serviced by a single station increased from 12 to over 25. Although the battery swap strategy is

considered "capital-intensive and difficult to profit from," it has been a core strategy for NIO since its inception. The battery swap network, as a crucial carrier for NIO's technology implementation, sees its large-scale layout as a means to rapidly translate technological achievements into market competitiveness. As the battery swap alliance based on NIO's technical standards continues to expand, it further consolidates NIO's first-mover advantage in setting industry technical standards. Infrastructure construction requires significant investment. Cooperation with CATL can effectively share the burden of heavy assets: optimizing battery standardization design through technology sharing, reducing battery R&D and production costs by leveraging CATL's industry chain resources, and simultaneously accelerating the unification of battery swap standards by relying on the industry influence of both parties. China's New Energy Vehicle Industry Development Plan (2021-2035) explicitly proposes improving the infrastructure system and accelerating the construction of charging and swapping infrastructure [31]. As an energy replenishment mode that can efficiently alleviate users' energy replenishment anxiety and range anxiety, the battery swap network is not only the infrastructure for technology implementation but also a strategic pivot for NIO's continued leadership in the high-end market and its penetration into the mainstream market.

Global Expansion: In June 2025, NIO officially announced plans to further expand into the European market from 2025 to 2026. NIO began entering Europe in 2021, starting from Norway and extending to four countries including Germany. From 2025 to 2026, NIO will cover 12 countries through a national general agent model, including seven countries like Austria and Belgium, and five countries like Portugal and Greece, simultaneously launching five deeply localized models. In China, the NEV market is highly competitive, presenting a "two giants and many strong players" competitive landscape. Europe is the world's second-largest NEV market, with a mature environmental policy system and consumer base. Entering the European market allows NIO to avoid fierce domestic competition and open up a second growth curve. Simultaneously, NIO's battery swap model directly addresses the pain point of European infrastructure. NIO has partnered with Shell to jointly build a charging and battery swap network. Furthermore, the EU's Fit for 55 package also presents opportunities for NIO's development. The EU Fit for 55 package explicitly requires a 55% reduction in new car carbon emissions by 2030 compared to 2021, achieving full life-cycle carbon neutrality by 2035, and requires member states to accelerate the deployment of relevant infrastructure based on zero-emission vehicle sales, achieving at least one charging point every 60 kilometers on major roads by 2030, among other measures [32]. This package creates a favorable development environment for NEV enterprises. With its advanced technology and forward-looking layout, NIO is poised to occupy a favorable position in this market transformation.

4. COMPARISON BETWEEN NIO AND XIAOPENG

As key players in China's new energy vehicle (NEV) sector, both NIO and XPeng prioritize technological innovation as their core driver but employ differentiated implementation paths and methods for building core competitiveness. This section will provide a comparative analysis focusing on the strategic positioning, technology routes, and financial status of NIO and XPeng.

NIO's core competitiveness lies in its premium services and battery swap network. Its sales reached 221,900 units in 2024, securing its place in the high-end market. Its unique battery swap model provides users with convenient energy replenishment experience, creating a differentiated competitive advantage. XPeng focuses primarily on intelligent driving technology, with its XNGP system achieving a high penetration rate of 87%, placing it in a leading position in the field of intelligent driving. However, in 2023, due to intense competition in the ¥200,000 price segment, its gross margin once fell to -6.1%, indicating pressure in cost control and market competition [33].

NIO's technology route emphasizes the battery swap ecosystem and full-stack in-house intelligent driving technology, whereas XPeng emphasizes full-stack in-house autonomous driving and ultra-fast charging ecosystem. Comparatively, NIO represents an ecosystem integration defined by

hardware experience, while XPeng represents an algorithm-driven end-to-end breakthrough. NIO's NAD (NIO Assisted & Intelligent Driving) system covers intelligent driving scenarios on highways and urban roads. The tape-out of its self-developed Shenji NX9031 chip and swarm intelligence technology enhance the efficiency and cost-control capabilities of its intelligent driving system. XPeng develops its own Turing AI chip as the implementation vehicle for its algorithms. In terms of intelligent driving, XPeng possesses China's first mass-produced urban scenario, high-level intelligent assisted driving system—XNGP—and the X-net deep visual neural network. In terms of intelligent services, XPeng is the first automotive brand in China with self-developed foundational voice capabilities, enabling multi-person, wake-up-free, simultaneous human-vehicle voice dialogue [34].

In terms of financial performance in 2024, NIO and XPeng showed different trends. Regarding revenue and sales volume, NIO holds an advantage in scale, while XPeng performed excellently in revenue growth rate. NIO's full-year 2024 revenue was ¥65.37 billion, a year-on-year increase of 18.2%; XPeng's full-year revenue was ¥40.78 billion, a year-on-year increase of 33.2%. NIO's revenue ranked second among new automakers for two consecutive years, benefiting from its scale, premium model pricing, and the brand added value of its swap network. XPeng's revenue in 2024 underwent a transformation from trough to peak, increasing from ¥6.55 billion in the first quarter to ¥16.11 billion in the fourth quarter. XPeng's Chairman, He XPeng, further stated that XPeng's total sales volume in 2025 would more than double compared to 2024. In terms of profitability, both companies face issues with losses. Compared to previous periods, NIO's losses expanded, while XPeng's losses reduced. NIO's net loss was ¥22.4 billion, an 8.1% year-on-year expansion; XPeng's net loss in 2024 was ¥5.79 billion, with its loss ratio decreasing from 25.4% to 14.2%. Regarding the loss situation, both NIO and XPeng have proposed achieving profitability in the fourth quarter of 2025. However, NIO has repeatedly made profit predictions before: predicting profitability in 2020 back in 2018, and expecting profitability in 2024 back in 2021, neither of which were successful. Moreover, NIO's net loss continues to worsen. NIO believes that a multi-pronged approach involving new model launches, gross margin improvement, and expense control will help it achieve this goal. In contrast, XPeng's net losses continuously worsened from 2021 to 2023, but 2024 marked a turning point. Losses narrowed significantly from ¥10.38 billion in 2023 to ¥5.79 billion in 2024, showing potential for achieving profitability in Q4 2025.

5. SWOT ANALYSIS

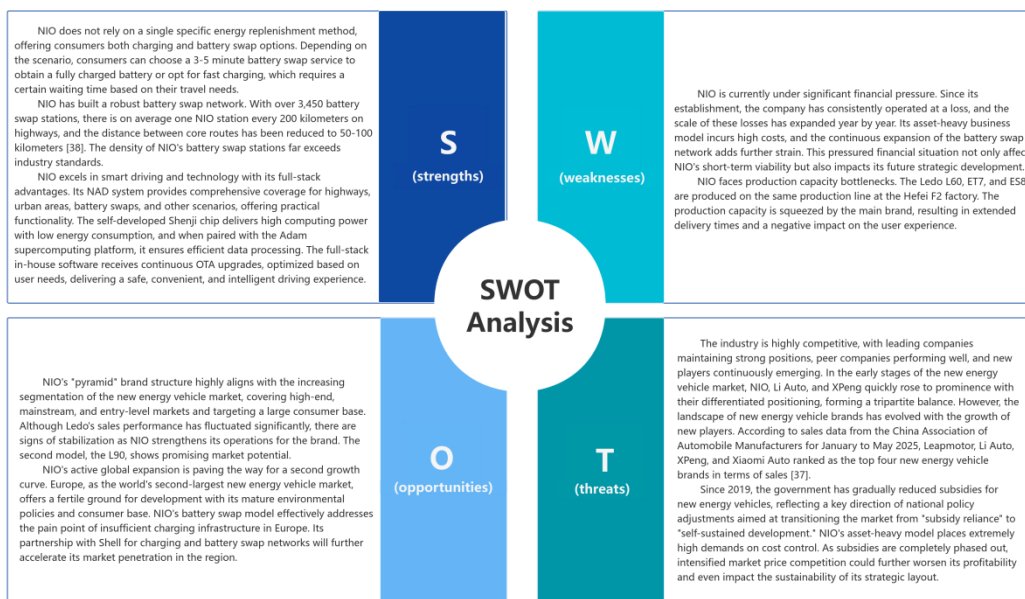


Figure 1. SWOT Analysis of NIO

6. CONCLUSION

This paper systematically examines NIO's strategic layout and development status during the widespread adoption phase of the new energy vehicle industry. By analyzing its financial performance, core strategies, market competition dynamics, and SWOT characteristics, the study reveals the opportunities and challenges faced by NIO amid rapid growth. NIO adheres to four key strategic directions: in-house technology development, multi-brand strategy, expansion of its battery-swap network, and global expansion, forming an interconnected strategic framework. Initiatives such as its full-stack in-house R&D system, battery-swap collaboration with CATL, and localized exploration in the European market demonstrate NIO's foresight and proactive approach in navigating industry transformation.

A critical opportunity for NIO lies in its aggressive overseas market expansion, which serves not only as a strategic move to mitigate risks from intense domestic competition but also as a core driver for unlocking a second growth curve. Europe, as the world's second-largest new energy vehicle market, offers an ideal environment for NIO's battery-swap model, thanks to its well-established environmental policies and underdeveloped charging infrastructure. Partnerships with local giants like Shell are expected to accelerate the localized deployment of its charging and battery-swap network, directly addressing users' energy replenishment concerns. If NIO can successfully adapt its "user community + premium services + battery-swap" model through innovation while overcoming challenges such as brand recognition and cultural differences, the European market could become a significant new source of revenue and profit, fundamentally alleviating its financial pressure.

Therefore, NIO's future development path requires a delicate balance between "expansion" and "profitability." In the short term, it must strictly control costs and enhance operational efficiency to ensure mass deliveries of its Onvo and Firefly brands, thereby diluting fixed costs. In the medium to long term, it needs to persist with in-house technology R&D to consolidate its first-mover advantages in autonomous driving and battery-swap standards, while sharing the substantial infrastructure investments through global ecological alliances. Only by doing so can NIO translate its strategic foresight into a sustainable business model, evolving from a high-profile "new player" into a globally competitive benchmark in the smart electric vehicle industry amid the unprecedented transformation of the global automotive sector.

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