A Brief Comparison Between Tesla and NIO In the Electric Vehicle Industry

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Abstract. In response to the pressing global issue of climate change and the growing emphasis on transitioning to electric vehicles (EVs), this research undertakes a comprehensive comparative analysis of two prominent players in the EV industry, Tesla and NIO. The study primarily centers on evaluating various dimensions of these two companies, encompassing their developmental trajectories, market shares, technological innovations, policy support, sustainability endeavors, brand images, and future outlook. The research methodology involves a mixed-method approach, integrating elements of literature review, case analysis, and statistical data analysis. This approach ensures a well-rounded investigation into the subject matter. Tesla, with its longer history and a more extensive global manufacturing presence, has established a dominant position within the electric vehicle market. Notable strengths include its unwavering commitment to technological innovation, resulting in significant market share, substantial delivery volumes, and robust revenues. Additionally, Tesla's brand recognition sets it apart as an industry leader. Conversely, NIO, though a relative newcomer, has carved out a niche primarily in the Chinese EV market. Despite financial challenges and limited international reach, NIO has exhibited promise through its innovative products and governmental support in China. Tesla is poised to continue expanding globally and pushing the boundaries of EV technology. Its strong brand image and emphasis on innovation are key assets. NIO aims to enhance its international competitiveness and further innovate its product offerings. Its success in the Chinese market, coupled with ongoing technological advancements, positions it for future growth.

Keywords: Tesla; comparison; electric vehicle.

1. Introduction

In light of the increasingly prominent global climate change issue, the environmental concerns stemming from conventional fossil-fuel-powered automobiles have garnered widespread attention. To address this challenge, governments worldwide have formulated policies to encourage and support the development of Electric vehicle, propelling the automotive industry towards electrification and intelligentization. Against this backdrop, Tesla and NIO, as exemplars in the field of new energy vehicles in the United States and China, have attracted significant scrutiny for their triumphant experiences in technological innovation, market exploration, and brand establishment. Their accomplishments merit thorough investigation and comparison. Currently, there are four main types of EVs, namely Battery Electric Vehicles (BEVs), Plug-in Hybrid EVs (PHEVs), Hybrid EVs (HEVs), and Fuel Cell EVs (FCEVs). Tesla and NIO are both Battery Electric Vehicle (BEV) manufacturers [1]. The cars they produce utilize pure electric power systems, using batteries to store energy and drive electric motors, without relying on internal combustion engines or hybrid systems. BEVs are EVs that are entirely powered by electricity supplied by the onboard battery packs. The first commercial EV, the Electrobat, was manufactured in 1894. However, early EVs used lead-acid batteries, which are cumbersome and have low energy density. Interest in electric vehicles experienced a resurgence in the late 20th century due to growing concerns about pollution and environmental issues, resulting in significant advancements in battery technology. In recent years, lithium-ion (Li-ion) Batteries played a pivotal role in revolutionizing the EV industry thanks to their high energy density, lightweight design, and extended lifespan. They have become the dominant battery type in modern electric vehicles, offering improved performance and an extended driving range. This study aims to comprehensively comprehend the divergences and convergences between

these two entities in various dimensions, encompassing developmental trajectories, industry scale, market share, technological innovation, policy support, sustainability, brand image, and future prospects. Through the lens of comparative analysis, not only can the successful experiences of both enterprises be distilled, but valuable insights and lessons can also be derived for other new energy vehicle manufacturers. Furthermore, this research holds potential to serve as a constructive reference for governmental bodies and industry policymakers, thereby facilitating the wholesome advancement of the new energy vehicle sector. This study will employ a mixed-method approach integrating literature review, case analysis, and statistical data analysis. [1] Through the collection and analysis of pertinent data and information concerning Tesla and NIO, an in-depth investigation and comparative analysis will be conducted. The primary objectives are as follows: to comprehend the developmental trajectories of Tesla and NIO, thereby revealing their growth trajectories within the new energy vehicle industry; to assess the industry scale and market share of Tesla and NIO, thereby evaluating their positions within the sector; to juxtapose the technological innovation advantages and features of Tesla and NIO, elucidating their innovative achievements within the electric vehicle technology domain; to explore the strategies and practices of Tesla and NIO concerning policy support and sustainable development; to analyze the brand image construction and future development plans of Tesla and NIO, thus envisioning their prospects within the new energy vehicle industry. Through the realization of these research objectives, this thesis will comprehensively assess the competitive advantages and disparities of Tesla and NIO within the new energy vehicle industry, offering profound insights and recommendations for the sector's future development.

2. Comparison of Tesla and NIO

2.1. Development and Industrial Scales

Tesla, initially co-founded in 2003 by Martin Eberhard and Marc Tarpenning, witnessed a significant juncture in 2004 when Elon Musk assumed leadership during its Series A funding phase. The company's nomenclature, "Tesla Motors," was chosen as an homage to the eminent physicist, Nikola Tesla. The pioneering model from Tesla's stable was the Roadster, a sleek two-door four-seater coupe that adopted a fully electric propulsion system. While the Roadster boasted stylish exterior contours and streamlined interior aesthetics, its range capability was relatively limited, confining its usage to shorter distances. Tesla confronted a myriad of challenges during its nascent phase, including elevated production costs and an incipient demand landscape. This period also witnessed a substantial executive reshuffle, with co-founder Peter Tarpenning's departure impeding Tesla's progression. By 2008, Tesla embarked on a transformative trajectory, unveiling the Model S, an electric sports car. The Model S flaunted a more avant-garde exterior, coupled with opulent interior appointments and significantly enhanced range capabilities. This pivotal introduction engendered heightened attention and market share, propelling Tesla toward eventual success. The transition phase witnessed the unveiling of two additional models, namely the Model X and the Model 3. The Model X, an SUV, featured an all-aluminum chassis, boasting a luxurious interior and expansive cabin space. In contrast, the Model 3, a compact electric sedan, was characterized by a novel design philosophy and advanced technologies, delivering a potent blend of extended range and affordability. In 2017, Tesla initiated global expansion, commencing worldwide sales of the Model 3. Simultaneously, Tesla penetrated the Chinese market, experiencing significant triumph within this realm. Bolstering its prominence, Tesla also introduced the Model S Performance during this phase, a superlative sports car characterized by sleek aesthetics, plush interior appointments, and substantially augmented range capabilities. This introduction fueled heightened attention and augmented market share, further propelling Tesla's ascendancy. Currently, Tesla has emerged as a foremost leader within the global electric vehicle landscape, underscored by an expansive global sales and service network. And Tesla operates five major vehicle manufacturing plants globally, with three located in North America, one in China, and one in Europe [2]. Additionally, they have facilities dedicated to powertrain batteries, energy storage, and solar production. Tesla has systematically formulated principles, norms, and

corporate governance frameworks for the advancement and commercialization of alternative energy vehicles. Put differently, the company has established a formidable competitive edge vis-à-vis original equipment manufacturers by strategically cultivating a corporate culture that places paramount emphasis on the conception, manufacturing, and promotion of electric vehicles. This strategy encompasses proficiency in production and cultivation of market relationships. Tesla's exclusive product focus remains squarely centered on electric vehicles, characterized by a supply chain marked by a substantial degree of vertical integration. This includes in-house battery and component manufacturing, in addition to the operation of a proprietary network of charging stations [3]. NIO, a Chinese electric vehicle manufacturer, was founded in 2014 by William Li, originally named "NextEV", has a relatively shorter developmental history compared to Tesla. In 2016, they introduced their first product, the EP9 electric supercar, which set several world records. The pivotal year was 2017 when NIO launched its first mass-production electric SUV, the ES8, garnering significant attention in the Chinese market. Following this success, NIO went public on the New York Stock Exchange in September 2018, becoming the first Chinese NEV manufacturer to do so. In 2019, NIO continued its momentum by releasing the ES6, a more compact electric SUV, and the EC6, a sportier electric vehicle model. The company's dedication to technological innovation led to the introduction of the NIO ET7 in 2021, a new electric sedan that showcased advancements in both performance and technology.

2.2. Market Shares and Marketing Strategy

Tesla commands a considerable market share on a global scale. Its upscale electric vehicle products have captivated consumers' attention and positioned the company as a vanguard entity within the global NEV market. Its market presence is notable in regions including the United States, Europe, and China. Conversely, NIO primarily focuses on the Chinese market, having garnered a market share through the introduction of distinctively positioned electric vehicle products. While its international influence may be comparatively modest, its competitive position within the domestic Chinese market is gradually consolidating. Table 1 shows the delivery volumes of both Tesla and NIO across different quarters. Tesla's delivery volume reached 422,875 units in the first quarter of 2023, marking an increase compared to the preceding quarter, which stood at 405,278 units in the fourth quarter of 2022. In contrast, NIO's delivery volume during the same period was relatively lower, with 31,041 units in 2023Q1, reflecting a decline from 40,052 units in 2022Q4 [4].

Table 1. EV Deliveries comparing

Numble	2023Q1	2022Q4	2022Q3	2023Q2
Tesla Total Deliveries	422,875	405,278	343,830	254,695
NIO Total Deliveries	31,041	40,052	31,607	25,059

Table 2 shows the total revenues of Tesla and NIO, measured in millions of US dollars, along with the year-over-year growth rates. Tesla's total revenue amounted to $23,329 million in 2023Q1, exhibiting a marginal decrease from the previous quarter, yet boasting a remarkable year-over-year growth rate of 47%. Conversely, NIO's total revenue for 2023Q1 reached $1,555 million, with a year-over-year growth rate of 7.7% [5].

Table 2. EV Revenues comparing

($ in millions, except percentages data)	2023Q1	2022Q4	2022Q3	2023Q2	YoY
Tesla Total Revenues	23,329	24,318	21,454	16,934	47%
NIO Total Revenues	1,555	2,329	1,678	1,537	7.7%

Based on these data, the researchers can delve into the analysis of the competition and performance of Tesla and NIO in the market. It is evidently clear that Tesla maintains a substantial lead in both delivery volume and total revenue, thus commanding a dominant market share. Tesla's delivery volume in 2023Q1 is nearly 14 times that of NIO, and its total revenue significantly surpasses that of

NIO as well. This disparity in market share can be attributed to several factors, including Tesla's early entry into the electric vehicle market, brand recognition, product performance, and technological innovation. Tesla's sustained growth and robust global market presence underscore its competitive standing within the electric vehicle industry. Nonetheless, NIO, despite having comparatively lower delivery volumes and total revenue, has sustained growth and a positive year-over-year growth rate. This suggests that NIO has carved out a niche in the electric vehicle market, with potential for further expansion, especially driven by technological innovation and ongoing product enhancements. In summary, the competitive performance between Tesla and NIO in the market is characterized by a pronounced disparity, with Tesla commanding a substantial market share and scale advantage, while NIO maintains growth momentum and a certain market presence.

2.3. Technological Innovation

Tesla has achieved significant breakthroughs in battery technology, electric propulsion, and autonomous driving. Its proprietary battery technology provides a competitive edge in terms of range and charging speed. Tesla's autonomous driving technology has also spearheaded industry-wide advancements, albeit encountering challenges pertaining to regulations and safety. Tesla consistently ranks at the forefront in various rankings, encompassing performance events, brand value, and operational metrics. In terms of performance, the Model S Plaid has achieved two consecutive world records: firstly, at the Nürburgring Nordschleife circuit, it secured the fastest lap time for an electric vehicle with a remarkable 7 minutes, 25.231 seconds. Secondly, it improved its quarter-mile acceleration time to within 8.73 seconds, surpassing its previous record of 8.834 seconds. In the realm of brand recognition, Boston Consulting Group (BCG) released its 2023 list of the most innovative companies, positioning Tesla as the highest-ranked global automotive brand and elevating it to second place in the overall rankings, marking a three-spot improvement from the previous year. Tesla's persistent appeal to global consumers stems from its unceasing product technology innovations. Behind Tesla's leading position in these rankings lies its solid product prowess. Tesla's all-new Model S and Model X have consistently maintained advantages in both performance and intelligence. The Model S Plaid achieves an astounding top speed of 322 km/h and boasts a 0-100 km/h acceleration time of 2.6 seconds. The Model Y all-wheel-drive variant offers an efficiency of approximately 6.4 kilometers per kilowatt-hour. Currently, all Tesla models can recharge over 250 kilometers of range in just 15 minutes [6]. NIO Inc. has established five major headquarters or centers worldwide: the Intelligent Connected Research Headquarters in San Jose, North America, the Advanced Engineering and Technology Center in London, the Design Center in Munich, the Intelligent Software Development Center in Beijing; and the Global Headquarters Research Center in Shanghai [7]. NIO has achieved integration across battery technology, electric propulsion, and electronic control systems through its "three-in-one" vehicle architecture. Although its autonomous driving technology is in a nascent stage, NIO continues to accumulate experiential insights.

The patent application trends of a corporation on a global scale can, to a certain extent, reflect its patent strategy and technological development directions over different periods. At a macroscopic level, these trends manifest alterations in the intensity of patent applications by the corporation during different time periods, offering insights into potential future developments in its patent strategy. Among these trends, patent application quantity and disclosure volume are commonly employed indicators to assess application trends and innovative capabilities [7]. In China, Tesla's patent applications predominantly consist of invention patents, constituting 75% of their total patent portfolio, a significantly higher proportion compared to NIO's 45%. Tesla's patent applications in utility models and industrial designs, on the other hand, exhibit lower percentages when contrasted with NIO. This implies that Tesla's patent emphasis primarily revolves around inventions. This strategic orientation aligns with the advantages of utilizing invention patents, characterized by relative stability of patent rights following substantive examination procedures. Tesla has advantage in innovation compared with NIO [8].

2.4. Policy Support and Sustainability

Tesla's commitment to sustainability is underscored by its efforts to popularize electric vehicles and mitigate environmental pollution. Initiatives such as battery recycling and charging infrastructure development embody its sustainability endeavors. The Inflation Reduction Act (IRA), passed in August 2022, includes various tax incentives and funding programs to meet the aim of building a clean energy economy. Part of the Act concentrates on accelerating EV adoption, with dedicated funding drawn from the USD 369 billion allocated for climate investments. The Clean Vehicle Tax Credit introduces a new set of conditions for EV models to qualify for incentives. Several of the major US automotive manufacturers have submitted a list of specific models that comply with the new requirements and removing the manufacturer sales cap of 200,000 means Tesla can participate in the scheme. The Act also commits USD 1 billion to incentives and infrastructure projects for HDVs between now and 2031.5 For vehicles from approved manufacturers, with 15 kWh or more of battery capacity, the tax credits are up to USD 40 000 per vehicle. In addition to demand-side credits for vehicle purchase, the IRA includes supply-side Advanced Manufacturing Production Tax Credits. Under this scheme, the US government provides subsidies for domestic battery production of up to USD 35 per kWh, plus another USD 10 per kWh for module assembly. Assuming average battery prices in 2022 are around USD 150 per kWh, these new US production incentives could account for nearly a third of total battery price. So, the factories of Tesla can benefit from it too [9]. NIO also champions green mobility yet lags behind in charging infrastructure and battery recycling.

In China, the largest market for electric cars, supporting EV manufacturers and companies through direct incentives along EV supply chains to ramp up domestic production is not a new phenomenon. The past decade has seen a sustained use of supply- and demand-side incentives for domestic firms, as well as joint ventures with international carmakers. Support has been particularly prevalent at the local level in China, thereby stimulating national uptake and the development of several major EV companies. Regions and cities have also recently announced targets for manufacturing, such as Chongqing’s goal to produce and sell more than 10% of China’s new energy vehicles (NEVs),3 and Jilin’s aim to reach an annual production capacity of around 1 million NEVs, both by 2025, supported by policies focusing on EV manufacturing.

2.5. SWOT Analysis

SWOT Analysis, initially proposed by K.J. Andrews of Harvard Business School in 1971 in his book "The Concept of Corporate Strategy," is a widely applied strategic framework in the field of economics. SWOT analysis is structured around the assessment of an entity's Strengths, Weaknesses, Opportunities, and Threats. SWOT analysis is a strategic planning tool, serves the fundamental purpose of systematically evaluating an entity's internal Strengths and Weaknesses, along with its external Opportunities and Threats. This structured assessment provides critical insights into the current state and prospects of an organization or situation. SWOT analysis is a valuable framework that enhances strategic planning, risk management, and resource allocation while providing a comprehensive understanding of an entity's internal and external factors. Its versatility makes it a widely adopted tool in academia and various industries for strategic assessment and decision-making [10]. Tesla's strengths begin with its relentless commitment to technological innovation. The company has continually pushed the boundaries of EV technology, revolutionizing the automotive industry with groundbreaking advancements such as self-driving capabilities and high-performance electric powertrains. Furthermore, Tesla boasts a robust brand presence, a testament to its visionary leadership and dedication to sustainability. Its global manufacturing footprint is another strength, facilitating efficient production and delivery of its EVs to consumers worldwide. Complementing this is Tesla's formidable research and development team, which consistently propels the company toward new frontiers in EV technology. But Tesla still faces notable weaknesses. Despite its innovative prowess, financial pressures have persisted due to massive investments in R&D and production capacity expansion. Additionally, its international market share remains somewhat limited, with a reliance on the Chinese market, making it susceptible to market fluctuations in that region. Moreover,

Tesla must grapple with challenges surrounding charging infrastructure, essential for the widespread adoption of EVs. On the horizon, Tesla finds promising opportunities. The prospect of international expansion beckons as it seeks to tap into burgeoning EV markets globally. Supportive government policies and incentives for new energy vehicles present growth potential, as do advancements in autonomous driving technology. The company can further capitalize on its position by integrating sustainable energy solutions, aligning with the global shift towards renewable energy sources. However, there are imminent threats. Intense competition from both established automakers and emerging EV startups poses a challenge to Tesla's market dominance. Supply chain vulnerabilities and disruptions can impact production and delivery schedules, while evolving regulatory and policy changes can influence Tesla's operational landscape. Lastly, the specter of global economic volatility looms, potentially impacting consumer demand for EVs and Tesla's financial performance.

NIO has continually pushed the envelope in the EV sector, pioneering innovations such as battery swapping technology. This relentless pursuit of technological excellence has bolstered its competitive position in the market. NIO's highly automated production processes stand as a testament to its efficiency and cost control. The company's strong brand awareness, particularly in the Chinese market, has cultivated a dedicated customer base. NIO's diverse product line, spanning SUVs to sedans, caters to varied consumer preferences, enhancing its market appeal. Nevertheless, NIO is not without its weaknesses. Early on, the company grappled with financial challenges, stemming partly from substantial investments in research and development and production. Its limited international presence exposes it to risks associated with dependence on the Chinese market. The competitive pricing landscape for EVs in China presents a continuous challenge to NIO's profit margins, and concerns about charging infrastructure development persist. Turning to the opportunities, NIO has the potential for global expansion, which would help diversify its market presence and reduce its reliance on the Chinese market. Supportive government policies in the new energy vehicle sector offer growth prospects, while advancements in autonomous driving technology align with the evolving demands of consumers. Moreover, NIO can capitalize on the growing trend towards sustainable energy solutions, further establishing itself as a leader in the green mobility space. However, there exist certain threats that demand careful consideration. Intense competition within the electric vehicle market in China poses a risk to NIO's market share and profitability. Supply chain disruptions can have cascading effects on production and delivery schedules, and evolving regulatory and policy changes could alter the business landscape significantly. Lastly, economic volatility, whether global or regional, has the potential to affect consumer demand for EVs and, consequently, NIO's financial performance.

Both Tesla and NIO occupy advanced positions within the electric vehicle (EV) sector, representing their respective countries, the United States and China, in the field of new energy vehicles. Given this common ground, there exist certain similarities in the SWOT analyses of the two companies, particularly with regard to Opportunities and Threats. While they are competitors, their future operating environments share commonalities. Tesla and NIO both have strong brand awareness and facing challenges related to charging infrastructure. While Tesla has innovated in battery swapping technology, the development of charging facilities remains a concern. Tesla has a longer developmental history, commanding a larger market share and higher production volumes. The company places a stronger emphasis on technological innovation and maintains a more globalized presence. However, its policy support is relatively less robust when compared to NIO. NIO, as a nascent electric vehicle enterprise, exhibits relatively unstable financial circumstances and possesses limited research and development capabilities. Presently, its primary focus is predominantly within the Chinese market, and it has yet to successfully expand its operations to a global scale. Tesla has established manufacturing facilities worldwide, while NIO's manufacturing is primarily centered in China. This gives Tesla a broader global market presence. Tesla faced financial pressures in its early years but has since become profitable. NIO also encountered financial challenges in its early stages, and its financial situation remains relatively unstable. And Tesla has a larger international market

share, while NIO primarily sells in the Chinese market. Tesla has more opportunities for international expansion [11].

2.6. Future Prospects

Tesla's globally recognized brand is synonymous with innovation and cutting-edge technology, positioning it as a high-end, avant-garde entity. Its high-quality, high-performance electric vehicles have propelled the growth of the electric vehicle market. In the future, Tesla will continue to invest in technological innovation and global market expansion. NIO has cultivated a brand image that emphasizes technology and futurism, which resonates particularly well within the Chinese market. Its strategic focus includes enhancing international competitiveness, driving technological upgrades, and advancing product innovation.

3. Conclusion

In conclusion, this paper conducted a comprehensive comparison between Tesla and NIO in the electric vehicle industry, examining various dimensions including their development trajectories, market shares, technological innovation, policy support, sustainability efforts, brand images, and future prospects. Tesla, with its longer history, global manufacturing presence, and strong emphasis on technological innovation, has emerged as a dominant player in the electric vehicle market. It commands a significant market share and boasts substantial delivery volumes and revenue figures. Tesla's brand recognition and relentless pursuit of cutting-edge technology have solidified its position as a leader in the industry. On the other hand, NIO, a relatively newer entrant, has found success primarily within the Chinese market. While it faces financial challenges and limited international presence, NIO has shown promise through its technological innovation and diverse product line. The company benefits from strong government support in China. Both companies share common challenges related to changing economic situation, but their approaches differ. Tesla's global presence gives it a broader market reach, whereas NIO focuses primarily on China. Tesla is poised to continue its global expansion and technological advancements, capitalizing on its strong brand reputation. NIO, on the other hand, aims to enhance its international competitiveness and further innovate its products. In terms of research impact, this study provides valuable insights into the competitive landscape of the electric vehicle industry, offering a detailed analysis of two prominent players. Policymakers and industry stakeholders can draw lessons from the experiences of Tesla and NIO to facilitate the development of the new energy vehicle sector. Additionally, the research sheds light on the importance of factors such as policy support, technological innovation, and global expansion in shaping the future of electric vehicle companies. Looking forward, the electric vehicle industry is poised for continued growth and evolution, with sustainability and technological innovation at the forefront. Both Tesla and NIO, along with other industry players, will play pivotal roles in shaping the future of transportation and environmental sustainability. As electric vehicles become more mainstream, competition will intensify, and companies that can adapt and innovate will thrive in this dynamic landscape. This research serves as a foundation for understanding these dynamics and offers a basis for future studies in the field.

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