Research on the development trend of new energy vehicles under the background of price war

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Abstract. In recent years, the new energy vehicle industry has experienced rapid growth, becoming a major market player. This development is highly driven by increased awareness of environmental issues and the advancement of policies and regulations aimed at promoting sustainable transportation. As a result, more consumers and manufacturers are focusing on electric vehicles, leading to significant changes in the automotive market landscape. This article introduces the new energy vehicles market under the background of price war. Although the demand growth slow down and the market recovery lagging temporarily, the market shows broad development space. However, the competition in the new energy market is raging, typically influenced by the price war. Companies had to reduce their profit as many subsidies was delivered by the governments and competitors. And the competition is distinguished in different price level, showing diverse price war feature. In such environment, companies in China are devoted into oversea market, bringing to additional expand and more styles of competitions and development.

Keywords: Energy vehicles, price war, export.

1. Introduction

Despite facing challenges such as slow domestic demand growth, high inventory pressure, intensified competition, and international trade protectionism, the new energy vehicle industry has demonstrated resilience. Government consumption-boosting policies, marketing efforts, and the introduction of new vehicle models have contributed to a recovery in automotive consumption. BYD interim report illustrates that a year-on-year increase in automobile production and sales of 4.9% and 6.1%, respectively. Strong growth in the new energy vehicle (NEV) sector, with production and sales rising 30.1% and 32.0%, respectively [1]. A significant increase in China's automotive exports, achieving a 30.5% year-on-year growth (BYD interim report 2024), further solidifying its position as the global leader in automotive exports. Domestic market share of Chinese automotive brands surpassed 60%, marking a historic high and indicating a transformation in the market structure [2-3].

Given the robust performance and growth prospects in the Chinese automotive sector, particularly in new energy vehicles, it would be strategic for stakeholders and investors to focus on this segment. Continued investment in technology and innovation will enhance competitiveness and market share. Additionally, monitoring regulatory changes and consumer trends will be essential for adapting to the evolving landscape.

The article aims at delivering analysis for the new energy market.

2. Basic Fact analysis

2.1. Introduction of the advance of China new energy vehicles

According to Figure 1, over the past six years, China's new energy vehicle (NEV) market has experienced remarkable growth, driven by government policies, technological advancements, and an increasing focus on sustainability [4-6]. Between 2018 and 2020, the production and sales growth of NEVs in China was relatively stable, indicating a steady increase without significant fluctuations. However, the growth rate of NEV production and sales began to accelerate significantly starting from 2021, marking a period of rapid expansion in the market. In 2023, NEV production and sales reached approximately 9.587 million and 9.495 million units, respectively. This represents a substantial year-

on-year increase, demonstrating strong consumer demand and market confidence. The calculation states that the market penetration rate of NEVs rose to 31.55%, indicating that more than a third of vehicle sales in China are now from the NEV segment. This reflects growing acceptance of electric vehicles among consumers. It is argued that China has maintained its position as the world's largest market for NEVs, consistently leading global production and sales figures. This positions China as a key player in the global shift towards electric mobility. Moreover, China's rapid growth in the NEV sector is highlighted as a significant driver of the global automotive industry's transition towards electrification, influencing trends and developments worldwide.

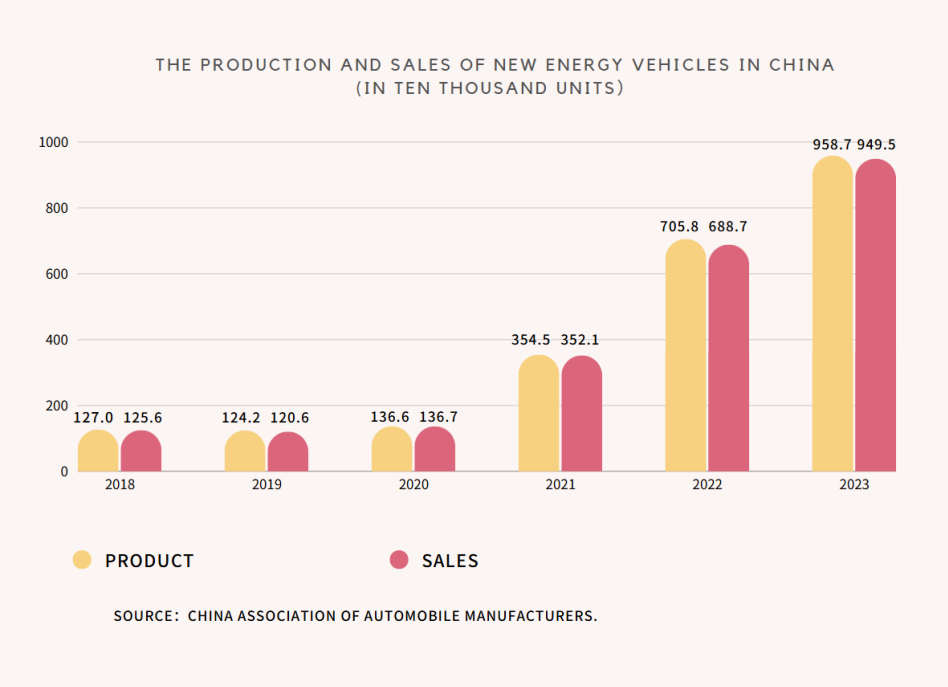

Fig. 1 The production and sales of new energy vehicles in China

Although price fluctuations in vehicles market may lead to lagging of recovery in 2023, the new energy vehicles market shows promising future, gradually developing its situation. China new energy vehicles penetration rate shows obvious increases at 31.6%, while passenger vehicles data in December 2023 climbed up to 40% [6]. There is no doubt that China vehicles market is experiencing a profound change. In certain countries, new energy vehicles are becoming more popular. Common new energy vehicles companies like Tesla, BYD, NIO could be well known for the public. Moreover, since the industry chain is getting mature and comprehensive, it shows more power to improve the companies in the respect as follows:

2.2. Price war

The Chinese new energy vehicle market has once again ignited a price war. Price adjustments was announced by several well-known companies, including BYD, GAC Group, and Xiaopeng Motors for their products [2]. Subsidy incentives were promised to attract more consumers. Such strategies not only intensify market competition but also signifies that the Chinese automotive market has entered a "heated" phase.

Behind the price war is the strategy focusing on volume. Chen state that new energy vehicle companies show a robust growth trend in this period [2]. In April 2024, BYD sold 313,200 new energy vehicles, a year-on-year increase of 49%. GAC Trumpchi officially announced sales of 37,733 vehicles in April, reflecting a year-on-year growth of 25.6%. Xiaopeng Motors also reported delivering 9,393 new cars in April, up 33% year-on-year. As the price war escalates, many companies are responding to government calls by launching "trade-in" policies to boost sales, further intensifying the competition.

Seven ministries, including the Ministry of Commerce and the Ministry of Finance, jointly issued that users who purchase new energy vehicles can receive subsidy of 10,000 yuan the (Implementation Rules for Automobile Trade-in Subsidies, 2024) [5]. It plays an important role in supporting the replacement of vehicles. This measure further enhances the price competition in the new energy vehicle industry. Automakers including BYD, Xiaopeng Motors are engaging in the policies of "trade in". To exemplify, BYD has implemented subsidies for its Dynasty models. Such subsidy primarily targets those who would like to replace old cars to new one from given series. Financial policies are introduced meanwhile.

3. New energy vehicle market analysis

3.1. Market overview

It is supposed that from this year to 2027, the global new energy vehicle (NEV) market may experience a significant slowdown compared to the past four years. In 2024, although the Chinese NEV market has not shown significant signs of slowing down, the growth rate in sales is not as strong as in the past. Passenger Car Association shows that in the first seven months of this year, cumulative NEV sales reached nearly 4.99 million units, a year-on-year increase of 33.7%, down from a 36.2% increase during the same period last year, which was over 90% in 2022 and over 160% in 2021 [6]. It's also noteworthy that this year's growth in domestic NEVs primarily relies on plug-in hybrid vehicles, which saw a year-on-year increase of 71.6% to 2.08 million units, while the growth rate for pure electric vehicles was only 15.5%.

Even more pronounced than the slowdown in sales growth is the significant reduction in prices for NEVs. This year, the price war for NEVs has intensified. The average price reduction for domestic NEVs has increased from 6,700 yuan in the first quarter of last year to 16,000 yuan in the first quarter of this year. This has resulted in the weighted average selling price of NEVs in the first quarter of this year being almost on par with traditional gasoline vehicles, with two-thirds of NEVs priced lower than similar gasoline models.

3.2. Brand analysis

During the price war, companies engaging in the competition at different price level including low, medium, and high-priced. Each price segment faces unique risks and challenges in terms of market competition, consumer demand, and technological development. To exemplify, Low-priced models typically have lower profit margins. Manufacturers may reduce costs at the expense of product quality and technology, damaging the brand image. Moreover, the competition environment here is fierce. The low-priced market is highly competitive, with many manufacturers surging for market share through lower price or financial policies, which can lead to price wars and weaken overall profitability. And what consumers may have most concerns about is the performance and safety of low-priced models, affecting their purchasing decisions. Especially, Low-priced models may lag medium and high-priced models in battery technology, range, and smart features, making it difficult to meet the growing demands of consumers.

Medium-priced models face competition from both low-priced and high-priced models, which may result in unclear market positioning and difficulty for consumers in making choices. And such ambiguous market position may worse the market concentration. From technological innovation perspective, there is a need to continuously innovate technologically to maintain competitiveness and meet consumer demands for range, smart features, and safety.

While high-priced models may face limited consumer market. The target consumer base for high-priced models is relatively limited, and sales may be impacted by economic conditions and consumer purchasing power. High-priced models typically require greater technological investment and innovation, resulting in higher R&D costs and potentially leading to profitability pressures. What challenge the vehicle suppliers is the requirements for brand image, and any negative news can quickly influence consumer purchasing decisions. Moreover, high-priced models must navigate

challenges in global market, such as market access regulations, and cultural differences in different countries and regions.

It is argued that the overall sales growth of new energy vehicles (NEVs) has slowed. However, there are still structural opportunities in segmented markets. It is argued that the market share of small car and large SUV have now reached saturation. However, there are still significant opportunities for NEV adoption in the popular family car market priced between 100,000 to 200,000 yuan. Concentrating on replacement opportunities, many automakers have introduced corresponding products. BYD was one of the first beneficiary. Chinese Automotive Data shows that in the A-segment sedan category, BYD's models Qin PLUS DM, Destroyer 05, and Qin PLUS EV ranked among the top six in sales [5].

3.3. Ntelligent driving

In the increasingly competitive market, automakers are focusing on enhancement of intelligent features. It is believed that Chinese consumers are no longer simply satisfied with the transition from fuel to electric vehicles, as seen in Western markets. Instead, they are more interested in advanced driver assistance systems and smart connectivity technologies, which can improve their driving experience. And they are also more willing to pay for these features. It shows a broad market for both automotive parts suppliers and automobile brand. Charging for software and driver assistance services can provide additional revenue for automakers.

Intelligent technology is at the forefront of the NEV revolution. Implemented a range of cutting-edge intelligent driving technologies that enhance the driving experience and safety for users [4]. Key features include an automatic parking system that utilizes high-precision lidar and cameras, advanced driver-assistance systems like adaptive cruise control and lane-keeping assistance, and remote vehicle control capabilities through a smartphone app. Many NEVs are equipped with semi-autonomous or fully autonomous driving capabilities, allowing for safer and more efficient travel. Integration of real-time traffic data and predictive algorithms are key function of such technology. They help optimize routes and reduce travel times.

Autonomous driving technology is another attempt which may have board market. It has evolved significantly, with two primary approaches emerging in the realm of perception systems: machine vision using cameras and the use of Light Detection and Ranging. Each method has its own strengths and weaknesses.

Machine vision path primarily utilizes a combination of millimetre-wave radar and cameras. Notable companies following this approach include Tesla, Mobileye, and Baidu Apollo. The system relies on cameras to model surrounding objects, integrating this data into a neural network for visual computation. This approach is mainly focused on the "recognition" aspect of autonomous driving. For instance, Tesla is a strong proponent of this vision-based approach, using multiple cameras in its vehicles (from Autopilot to Full Self-Driving, or FSD). The company employs artificial intelligence and deep learning to enhance its neural networks, positioning cameras as the most crucial "eyes" for its driver assistance systems.

LiDAR approach is cantered on high-precision maps combined with Light Detection and Ranging. Companies like Waymo and Huawei represent this approach. LiDAR provides precise depth information and can generate high-resolution 3D maps, helping vehicles better understand their environment. And LiDAR can deliver real-time environmental scanning data, quickly identifying the distance and shape of surrounding objects. However, the manufacturing and integration costs of LiDAR are relatively high, limiting its use in some low-cost vehicles.

During the production, some companies would like to combine both machine vision and LiDAR. Taking Waymo's perception system as an example, it uses a combination of cameras and LiDAR. Most of the perception tasks are accomplished by four LiDAR units.

3.4. Smart terminals

Smart terminals and charging infrastructure play a crucial role in supporting the NEV ecosystem. Many manufacturers and third-party providers offer apps that allow users to locate charging stations, monitor charging status, and manage billing, enhancing the overall user experience. Moreover, charging stations connected to smart grids can optimize energy distribution, manage loads, and incorporate renewable energy sources.

Automakers that collaborate closely with intelligent driving companies can all offer urban NOA (Navigation on Autopilot) as a service. Customers can choose to purchase it through annual or monthly subscriptions, or even through a one-time payment for the software service.

3.5. Oversea Opportunity and Challenge

As competition in the Chinese domestic market intensifies, more and more domestic brands are turning their targeted market to overseas markets, leading to a record high in China's automotive exports. Chinese Automative Data shows that China exported 1.203 million new energy vehicles, accounting for 24.5% of total automotive exports, becoming a significant growth driver for automakers [6].

In the future, the global new energy vehicle market remains a promising future with enormous market potential. According to Bloomberg New Energy Finance's report, under a scenario of economic transformation, global annual sales of new energy passenger vehicles are expected to exceed 30 million by 2027 and further grow to 73 million by 2040, representing 33% and 73% of that year's global new passenger vehicle sales. To exemplify, in the first half of 2024, BYD's sales of new energy passenger vehicles reached 1.607 million units, a year-on-year increase of 28.8%, maintaining its position as the top-selling Chinese automotive company [4]. Among these, overseas sales exceeded 203,000 units, marking a year-on-year growth of 173.8%. BYD has entered over 88 countries and regions worldwide, covering more than 400 cities. The company has also invested in factories in overseas markets such as Brazil, Hungary, and Thailand, becoming a 'new business card' for Chinese manufacturing.

However, the influence of taxes, anti-dumping measures, and trade wars on the overseas market for Chinese new energy vehicle (NEV) companies can be significant and multifaceted. Tariffs impose additional costs on Chinese NEV manufacturers when exporting to markets like the U.S. and Europe. For instance, if the tariff rate increases from 25% to 100%, the final price of the vehicle in the foreign market may rise significantly, making Chinese vehicles less competitive compared to local or other international brands. Moreover, Trade barriers can limit the ability of Chinese NEV companies to enter or expand in lucrative markets. This is particularly relevant in regions where local production is favored or where tariffs are prohibitively high, affecting overall sales growth.

These trade policy barriers have had an immediate impact on China's new energy vehicle exports. General Administration of Customs of China shows that in June, exports of electric vehicles to the EU amounted to27,180 units, a decrease of 25% compared to May's 36,217 units, and a 31% decline compared to the same period last year.

However, EU will still be a potential destination for China's new energy vehicle exports over the next three years. On one hand, the decline in battery costs in China can offset about 90% of the tariff increases at the approximately 30% tariff level. Rechargeable batteries are a critical component of NEVs, directly impacting their performance, range, and environmental footprint. The most common one is lithium-ion batteries, which is used in NEVs known for their high energy density and efficiency. While from safety perspective, solid-state batteries promise greater, faster charging spending compared to traditional lithium-ion batteries.

On the other hand, from a competitive landscape perspective, China’s competitively priced models currently face few strong competitors overseas, while European and American companies are slowing down their electrification efforts.

4. Conclusion

The New Energy Vehicles market is transforming the automotive landscape, driven by intelligent technology, a growing roster of established brands, advancements in rechargeable battery technology. As the world shifts toward more sustainable transportation solutions, the NEV market is poised for continued growth and innovation, offering exciting opportunities for consumers and manufacturers alike. As the country continues to push for greener transportation solutions, the outlook for NEVs remains bright, positioning China as a leader in the global automotive transition towards sustainability.

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