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FUTURE DEVELOPMENT OUTLOOK OF CHINESE ELECTRIC VEHICLE INDUSTRY

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Annotation. The main purpose of the research: Make outlook for future development of electric vehicle industry. The object of the research: Research on development of Chinese electric vehicle industry. The subject of the research: Research on the electric vehicle industry. Possible practical application fields: The outlook for future development of electric vehicle industry can provide industry references for relevant enterprises, investors, and governmental management departments to make decisions in the future. Results obtained: 1. Determine the future development trend of the electric vehicle industry. 2. Make predictions on the future development of the electric vehicle industry.

Key words: Electric vehicle industry, Outlook for future development, Development Trend.

Introduction

In the 1990s, as a result of the oil crisis and environmental constraints, major automakers began to develop electric vehicles in search of alternatives to fuel vehicles. The development of electric vehicles in China started in the 1970s and progressed relatively quickly with the support of a number of policies. around 2008, the development of electric vehicles in China was on track and a large number of electric vehicle brands emerged. After years of development, the technological direction of electric vehicles has been determined to be mainly pure electric, and other technological directions are also being explored.

By the end of 2023, the market size of Chinese electric vehicles will reach 1 trillion RMB, and with the development of technology and policy changes in the future, the entire Chinese electric vehicle industry will move to a higher level, and the future development trend of the electric vehicle industry has become the direction that major electric vehicle

enterprises are actively exploring.

This article will analyse the future development trend and market size of Chinese electric vehicle industry on the basis of the current development of electric vehicles, based on the development of electric vehicle industry over the past years and data to predict the future development trend and market size.

Development status of Chinese electric vehicle industry

In 2023, the production and sales volume of electric vehicles in Chinese will be 9,587,000 and 9,495,000 respectively, with a growth of 35.8% and 37.9%, and the penetration rate of sales volume will reach 31.6%, accounting for more than 60% of the global sales volume. Electric vehicles produced in China will be sold in the domestic market of about 8.3 million vehicles, accounting for more than 85% of the total. In 2023, the production and sales volume of electric vehicles in Chinese will be 9,587,000 and 9,495,000 respectively, with a growth of 35.8% and 37.9%, and the penetration rate of sales volume will reach 31.6%, accounting for more than 60% of the global sales volume; electric vehicles produced in China will be sold in the domestic market of about 8.3 million vehicles, accounting for more than 85% of the total. In the global market, Chinese brands of electric vehicles have also demonstrated strong competitiveness and development potential, with several Chinese brands ranked in the top ten in the global sales ranking of electric vehicle brands. These figures not only demonstrate the development achievements of the Chinese electric vehicle industry, but also foreshadow that the market will continue to maintain strong growth momentum in the future. China is the world's largest auto market and the world's most open auto market. Multinational auto companies and local Chinese auto companies are competing on the same stage in the Chinese market, which is fair and fully competitive, and promotes rapid and efficient iteration and upgrading of product technology.

Development Trend of Electric Vehicle Industry

Deep electrification is the core trend in the development of electric vehicles. Deep electrification of electric vehicles refers to the trend of the automobile industry's full transition to pure electrification. Current electric vehicles are not only pure electric vehicles (EVs), but also include other hybrid forms. Battery electric vehicles (BEVs) are regarded as the development trend of electric vehicles, and are the core of the deep electrification of the electric vehicle industry. With the continuous progress of battery technology, including the improvement of energy density, faster

charging, and cost reduction, the range of pure electric vehicles has increased significantly, and user anxiety has been greatly reduced.

Intelligent network connectivity is also an indispensable development trend for electric vehicles. By integrating advanced sensors, artificial intelligence algorithms and modern communication and network technologies, and realising the exchange and sharing of intelligent information between vehicles and people, vehicles, roads and backstage, electric vehicles are able to realise functions such as automatic driving and remote control, and enhance driving safety and convenience, with the characteristics of safety, comfort, energy saving and high efficiency.

The trend of high-end electric vehicles is also becoming more and more obvious. Electric vehicle companies have launched high-end models, not only in the appearance design, interior configuration, but also in the intelligent, comfort, safety performance and other aspects of a comprehensive upgrade. The core of premiumisation is to provide excellent driving experience, advanced technology application and unique brand value, so as to stand out in the competitive market.

In addition to the above, one of the development trends is the deep integration of the electric vehicle industry, which refers to the deep integration and synergistic development of the automotive industry with energy, transport, information and communication and other fields. This kind of integration is not only about upgrading the power system, but also covers many aspects such as modernisation, lightweighting, intelligence and internet connectivity, forming a brand new business model and automotive ecology, thus overturning the perception of the traditional industry.

Trends in Chinese Electric Vehicle Industry

The market continues to expand. China is currently the world's largest market for electric vehicles, and sales continue to grow.²⁰²⁴ In the first nine months, China's electric vehicle sales hit another record high, and will continue to grow rapidly in the future as it is expected to do so in the coming years.

Strengthened policy support. As part of China's national strategy, policy support for the EV industry will be adjusted in the future as the Chinese government continues to roll out policies to promote the production and consumption of EVs. Including financial subsidies, tax breaks, etc. In addition, the policy direction will become increasingly obvious, there are already cities that have begun to limit the passage of fuel vehicles in the city area, and there will be more such restrictions in the future.

Accelerated technological innovation. In order to maintain a leading position in the electric vehicle industry, Chinese electric vehicle enterprises will continue to carry out technological research and development in battery technology and intelligent driving to improve the performance of electric vehicles and user experience.

Diversification of EV brands. With the deep development of the electric vehicle market, more capital will come down to join the competition in the electric vehicle market in the future, so electric vehicle brands will surely see a number of new brands in the future, and local brands will continue to make an effort to make an impact on BYD's market head position in the market. Meanwhile, traditional carmakers are also accelerating their transformation with more electric models.

Forecast of the Overall Development of Chinese Electric Vehicle Industry

According to the China Association of Automobile Manufacturers (CAAM), EV sales in China will reach 9.495 million units in 2023, and based on current sales figures and market growth projections, it is expected that sales could reach 25 million units by 2030, with EVs accounting for more than 50 percent of new car sales.

We can use the official forecast data to forecast the future data based on the production and sales volume of electric vehicles in the past years, and two methods are used here, which are: simple moving average method, and weighted moving average method. However, in order to forecast the data more accurately, the data from 2024 to 2026 were not forecasted directly, but the data from 2017 to 2019 were first used to forecast the data for 2020, and then the margin of deviation was calculated by comparing it with the actual data. The data for 2024 to 2026 were then projected and data corrections were made using the margin of deviation to improve the accuracy of the projections.

The annual production and sales data of EV in China from 2013 to 2023 are shown in the table 1 below:

Table 1 – The annual production and sales data of EV in China from 2017 to 2023

Year	Output(k.units)	Sales volume(k.units)
1	2	3
2017	770	777

End of table 1

1	2	3
2018	1270	1256
2019	1242	1206
2020	1366	1367
2021	3545	3521
2022	7058	6887
2023	9587	9495

According to the Simple moving average method, the formula for the predicted value in year n is as follows (1):

$$T_n = (t_{n-3} + t_{n-2} + t_{n-1}) / 3 \quad (1)$$

Based on this formula, our forecast of EV production and sales in 2020 can be derived as follows using only data from 2017 to 2019 in the table 2:

Table 2 – Forecast of EV production and sales in China in 2020 by Simple moving average method

Year	Output(k.units)	Sales(k.units)
2017	770	777
2018	1270	1256
2019	1242	1206
2020	1094	1079.67

Next we use the weighted moving average method, according to the calculation method, the predicted values for year n are calculated as follows (2):

$$T_n = w_1 * t_{n-1} + w_2 * t_{n-2} + w_3 * t_{n-3} \quad (w_1 + w_2 + w_3 = 1) \quad (2)$$

According to the formula, we still need to use the data from 2017 to 2019, but the proportion of the weight of each item, t_{n-1} year's proportion is the largest and decreases year by year, so we can set: $w_1 = 0.85$, $w_2 = 0.1$, $w_3 = 0.05$. According to this setting can be obtained as follows in the table 3:

Table 3 – Forecast of EV production and sales in China in 2020 by Weighted moving average method

Year	Output(k.units)	Sales(k.units)
2017	770	777
2018	1270	1256
2019	1242	1206
2020	1221.2	1173.1

However, after forecasting through the above two methods, it was found that the final result was not in line with the reality, therefore, we replaced the value of production and sales volume with the annual growth rate and took the above two ways to calculate, which led to the following two results respectively in the table 4 and 5:

Table 4 – Forecast of EV production and sales in China in 2020 by Simple moving average method with the annual growth rate

Year	Output(k.units)	Growth rate	Sales(k.units)	Growth rate
2017	770	0.540	777	0.533
2018	1270	0.649	1256	0.616
2019	1242	-0.022	1206	-0.040
2020	1725.26	0.389	1651.90	0.370

Table 5 – Forecast of EV production and sales in China in 2020 by Weighted moving average method with the annual growth rate

Year	Output(k.units)	Growth rate	Sales(k.units)	Growth rate
2017	770	0.540	777	0.533
2018	1270	0.649	1256	0.616
2019	1242	-0.022	1206	-0.040
2020	1332.91	0.073	1271.65	0.054

At this point we then averaged the four sets of data to calculate the following results in the table 6:

Table 6 – Forecast of EV production and sales in China in 2020

Year	Output(k.units)	Sales(k.units)
2017	770	777
2018	1270	1256
2019	1242	1206
2020	1343.34	1294.08

As the forecast result is only based on the production and sales volume in previous years, without more data, the accuracy of the forecast result is not enough, so the result is still a little error with the official ‘Chinese electric vehicle production and sales volume in 2020 will be 1,366,000 and 1,367,000 respectively’, according to the calculations, the error with the actual data is respectively 1.687% and 5.635% respectively.

Using the same methodology as above, we projected the data for the years 2024-2026 and after correcting for errors, the final figures are as follows in the table 7:

Table 7 – Forecast of EV production and sales in China in 2024 to 2026

Year	Output(k.units)	Sales(k.units)
2021	3545	3521
2022	7058	6887
2023	9587	9495
2024	12038.50	11305.82
2025	17655.33	16684.25
2026	26090.99	24741.14

This result and the official ‘2024 January to September, new energy vehicle production and sales were completed 8,316,000 units and 8,320,000 units, respectively, year-on-year growth of 31.7% and 32.5%,’ the gap between the data has been very small, only 7.896% and 1.88%, the error in the The error is within a reasonable range. Therefore this data projection can be used as a reference. The reason for the error is related to the significant increase in data for 2022.However, with the accumulation of data, the error will become bigger and bigger, so the data forecasts for 2025 and 2026 may have a large error with the actual data, but we cannot

rule out the possibility that due to certain reasons, the production and sales volume of the whole industry will show a significant increase.

Conclusion

Combined with the development history of the products in the current market and the social development trend, and it can be found that these development trends are consistent with the current trend of cutting-edge science and technology in the society, such as intelligentisation and internet connectivity. At the same time, based on the electric vehicle production and sales data of previous years, the current production and sales volume is forecasted, and the forecast deviation margin is calculated based on the difference between the forecast value and the official data, which is then used as the basis for forecasting and correcting the market data of the next three years, and arriving at the final result.

Under the influence of environmental, political and economic factors, electrification of automobiles has been an unstoppable trend. China's electric vehicle industry has embarked on the path of standardised development and is leading the way for the whole industry, while Germany, as a traditional automotive powerhouse, also has great potential for development. Whether in China or Germany, the e-mobility industry is set to grow rapidly in the coming years, driving sustainable economic, environmental and social development. With continued policy support and increased market demand, electric vehicles will become the mainstream choice for travelling in the future.

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