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Theory and International Processes

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GRADUATION THESIS

on

Development of New Energy Vehicle Production and International Trade in China

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FSBEI HE Penza State University
Institute of Economics and Administration
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Field of study 38.04.01 Economics,
Master's degree programme International Economics and Business

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«_____» _____ 20__

ASSIGNMENT
FOR THE GRADUATION THESIS OF

Master's degree student Sun Pengfei, group 23ЭЭВам1, full-time mode of study

1. The topic of the graduation thesis: "Development of New Energy Vehicle Production and International Trade in China "

was approved by the university order

dated «__» _____ 20__ no. _____

2. The deadline for the Master's degree student to complete the graduation thesis is 11.06.2025.

3. The input data for the graduation thesis is the regulatory and legal framework, scientific literature and reference books, and Internet data.

4. The list of issues to be studied includes the difference between the development of new energy vehicles in China and the world, the advantages and disadvantages of new energy vehicles in China in international trade, and how to better develop the new energy vehicle industry.

5. The list of visuals contains tables and figures.

6. The date of setting the assignment is 7.09.2023.

Academic adviser _____ / Dubina A. Sh. /
(signature) (full name)

The assignment was accepted by Master's degree student _____ / Sun Pengfei /
(signature) (full name)

Schedule for completing the graduation thesis

№ п/п	Content of the thesis	Deadline for completion	Due date, signature of the academic adviser
First year of study			
1	Substantiating of the research topic and methodology, subject and object of research	1.09.2023 – 31.10.2023	
2	Framing the scientific concept of research	1.11.2023 – 18.12.2023	
3	Collection of scientific literature for the thesis	19.12.2023 – 15.01.2024	
4	Substantiating the relevance, concept, and novelty of the research	16.01.2024 – 19.02.2024	
5	Framing of a detailed plan and layout of the research	20.02.2024 – 12.03.2024	
6	Studying new literature sources within the topic of the thesis	13.03.2024 – 26.03.2024	
7	Conducting theoretical research within the first chapter of the thesis	27.03.2024 – 30.04.2024	
8	Preparing the first chapter of the thesis	1.05.2024 – 30.06.2024	
Second year of study			
9	Conducting analytical research within the second chapter of the thesis	1.09.2024 – 22.10.2024	
10	Preparing the second chapter of the thesis	23.10.2024 – 24.12.2024	
11	Conducting analytical research within the third chapter of the thesis	25.12.2024 – 25.02.2025	
12	Preparing the third chapter of the thesis	26.02.2025 – 21.04.2025	
13	Preparing the introduction and conclusion	22.04.2025 – 12.05.2025	
14	Completing the graduation thesis	13.05.2025 – 26.05.2025	
15	Handing in the thesis for compliance control and antiplagiat	27.05.2025 – 9.06.2025	
16	Getting acquainted with the feedback and review	10.06.2025	
17	Presenting the written thesis	11.06.2025	

Academic adviser _____ / Dubina A. Sh. /
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The assignment was accepted by Master's degree student _____ / Sun Pengfei /
 (signature) (full name)

Summary

The graduation thesis comprises 71 pages, 3 chapters, 7 figures, 5 tables, 55 sources, 0 annexes.

NEW ENERGY VEHICLES, BYD, TESLA, TRADITIONAL MARKET

The target of research is Analysis of the development status and trend of new energy vehicle production and international trade in China.

The goal of work is to study learning the advantages and disadvantages of China's new energy automobile industry.

The methodological framework of the paper is formed by the complex of theoretical and practical methods such as literature review, data analysis, comparative analysis, and case studies.

The results of research include: China's new energy vehicles have developed rapidly in recent years, accounting for an increasing proportion in China's automobile import and export trade, and have obvious competitiveness in the international market.

The recommendations on disseminating and applying the results are as follows: The government has improved policies and market management, and strengthened external communication. Enterprises pay attention to personnel training, establish an industry standard system, and make targeted improvements for different markets.

The theoretical relevance of the thesis is established by studying the import and export trade of new energy vehicles in China, the applicability of comparative advantage theory in emerging industries is verified. China has formed a new comparative advantage in the field of new energy vehicles by virtue of its industrial chain advantages and technological innovation. Based on the innovation-driven theory, this paper discusses the role of technological innovation in promoting the development of new energy automobile industry and international trade, which provides a theoretical basis for the formulation of industrial policies.

The target of research can be further explored through Strengthen technological innovation, pay attention to personnel training, carry out localized development, optimize and improve policies and sustainable development.

Contents

Introduction.....	3
Chapter 1 China's international trade situation of new energy vehicle production.	5
1.1 Overview of import and export of new energy vehicles in China.....	5
1.2 BYD and Tesla's international trade strategy and status comparison....	13
1.3 The impact of China's new energy vehicles on China's.....	23
Chapter 2 Analysis on Influencing Factors of New Energy Vehicle Production and International Trade in China.....	26
2.1 Analysis of the External Environment of New Energy Vehicle.....	26
2.2 SWOT Analysis of BYD.....	30
2.3 Comparison of the competitiveness of major export market of China and Thailand.....	36
Chapter 3 Future prospects and suggestions.....	43
3.1 China New Energy Automobile Industry Development Trend Forecast	43
3.2 BYD and Tesla in the international market development strategy recommendations.....	47
3.3 Government's support suggestions in policy, technology and market	53
Conclusion.....	61
References List.....	63

Introduction

In recent years, under the situation of technological change and global carbon emission reduction, many countries have encouraged the development of new energy automobile industry and introduced many related support policies. "Environmental protection and low carbon" have become the key development direction of major car companies. The market scale of new energy vehicles in China has gradually expanded, and its production and sales volume has ranked first in the world in the past few years, and remarkable progress has been made in industrial technology and industrial system. Under the influence of the increasing trade friction between China and the United States and the rapid development of new energy automobile industry in Europe and the United States, the export trade of new energy vehicles in China is hindered. In the face of such international competition, it is necessary to sort out the current situation of China's new energy automobile industry development and export trade, analyze its development trend and characteristics, and put forward relevant suggestions in combination with the opportunities and challenges faced by China's new energy automobile development at present.

In recent years, the introduction of "double carbon" policy has promoted the development of clean energy industry in China, and the development of new energy automobile industry has attracted much attention. With the support of technological innovation policy, various new energy automobile enterprises have continuously enhanced the competitiveness of their products, and the number of independent brands has gradually increased. China new energy automobile has begun to enter a high- quality development

stage, and foreign trade has shown a good development trend. Based on this, it is extremely important to analyze the development of new energy automobile industry in China [31, p. 8].

As a big producer of new energy vehicles, China ranks first in the world in terms of production and sales volume for many years, and its industrial scale is constantly expanding and its industrial system is becoming more and more perfect. In recent years, with the support of forward-looking policies, the supply and demand of new energy vehicles in China have shown a rapid growth trend, and the potential market scale is huge, which gradually changes from the growth period to the adjustment period. After years of development, China's new energy vehicle industry technology has been upgraded, the industrial chain construction has been gradually improved, and the production capacity and scale of new energy vehicles rank among the top in the world. In the power battery industry, China is in the first echelon and has reached the international advanced level. In recent years, local battery manufacturers in China, represented by Contemporary Amperex Technology Co., Limited and BYD, have continuously upgraded their technologies and introduced blade batteries to improve battery quality. In 2022, Funeng Technology launched a brand-new SPS power battery solution, which organically combined large-scale battery manufacturing, batteries, battery systems and renewable energy technologies, achieving the perfect combination of four innovative technologies. In the aspect of motor control, China's domestic technology is basically mature, and the self-supporting rate of driving motor is above 95%. It has relatively mature technology in battery and vehicle controller, and the integrated power system of reducer, driving motor and motor controller also has great market competitiveness.

Vigorously developing the new energy automobile industry is a major strategic decision made by Chinese government departments. Since 2012, China has successively issued more than 600 supporting policies covering many aspects, among which the New Energy Automobile Industry Development Plan (2021– 2035) issued at the end of 2020 provides a strong support for the development of the new energy automobile industry [5, p. 1]. In recent years, the new energy automobile industry in China is changing from policy–driven to market–driven, and the decline of subsidy policy has brought considerable pressure to the new energy automobile industry. exist

Under the background of carbon emission reduction, China government made a timely decision to extend the exemption of purchase tax for new energy vehicles and reduce the purchase tax for some passenger cars. The preferential policy of "continuity + stage" was introduced at the same time, and measures such as tax exemption and tax reduction went hand in hand, which played a great role in stimulating the recovery of the automobile market and improving domestic demand.

Chapter 1 China's international trade situation of new energy vehicle production

1.1 Overview of import and export of new energy vehicles in China

As one of the key technologies to reduce environmental pollution, the development of new energy vehicles is highly valued by the China Municipal Government. Although the definition of this concept has not formed a unified standard, its technical core lies in the use of unconventional vehicle fuel or new power devices, and the integration of power control and drive technology to build a vehicle system with advanced principles and structures. According to the difference of technical route and energy supply mode, new energy vehicles mainly include pure electric vehicles (BEV), plug-in hybrid vehicles (PHEV) and fuel cell vehicles (FCEV). Among them, the battery is the only power source for pure electric vehicles, and the selection of its power battery directly affects the driving range and energy density characteristics. The research shows that the quantitative analysis framework of mileage mass and energy density can be established by comparing the characteristics of power battery selection of different technical routes, which provides technical reference for product development. Plug-in hybrid electric vehicle can realize the cooperative drive of fuel and electricity by integrating internal combustion engine and electric motor, which can reduce the carbon emission level under certain working conditions. At the level of battery management system, based on the newly defined SOC-OCV relationship and adaptive Kalman filter technology, the state estimation accuracy of hybrid electric vehicle battery pack can be effectively improved, thus optimizing the energy

allocation strategy. Fuel cell vehicles use hydrogen and other fuels as the medium to generate electric energy through electrochemical reaction to drive vehicles. Its technical route depends on the improvement of the preparation, storage and filling system of hydrogen energy. In the aspect of environmental impact assessment, the carbon emission levels of hybrid electric vehicles and electric vehicles in the whole life cycle need to comprehensively consider the emission characteristics of energy sources, manufacturing processes and use stages. At present, the research has carried out multi-dimensional comparative analysis through global warming potential (GWP) and other indicators. The differentiated characteristics of these technological paths not only shape the diversified development pattern of the new energy vehicle market, but also provide technical reference for the formulation of international trade policies [19, p. 33].

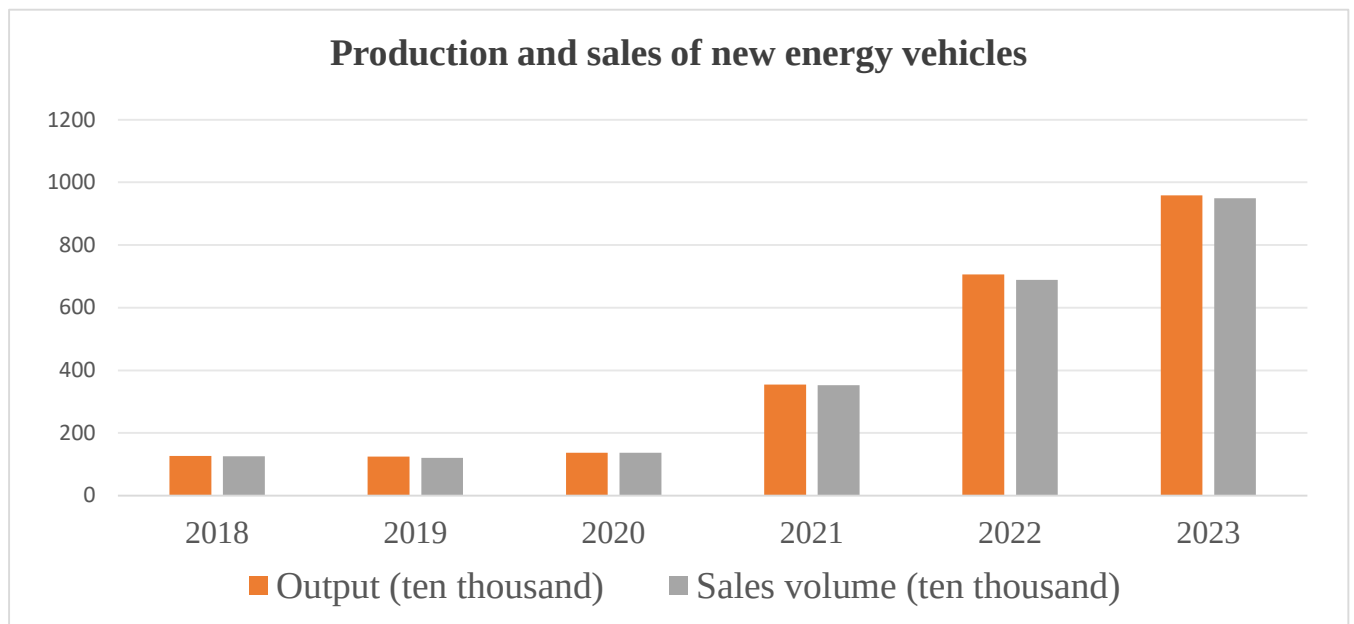


Figure 1.1 – Production and sales of new energy vehicles [27]

In recent years, with the support of national policies, China's new energy automobile

industry has made great progress, not only in the domestic market, but also in the international market. In recent years, the international competitiveness of China's new energy vehicles has been continuously improved, which has formed a new force to promote the scale and quality of China's automobile foreign trade.

According to the statistics of China General Administration of Customs, from 2019 to 2022, the export scale of China's new energy automobile industry showed a trend of rapid growth. In 2021, 310,000 new energy vehicles were exported. In 2022, the export volume continued to increase, with a total of 7,640 million vehicles exported throughout the year, and the export volume of new energy vehicles in China reached a new high.

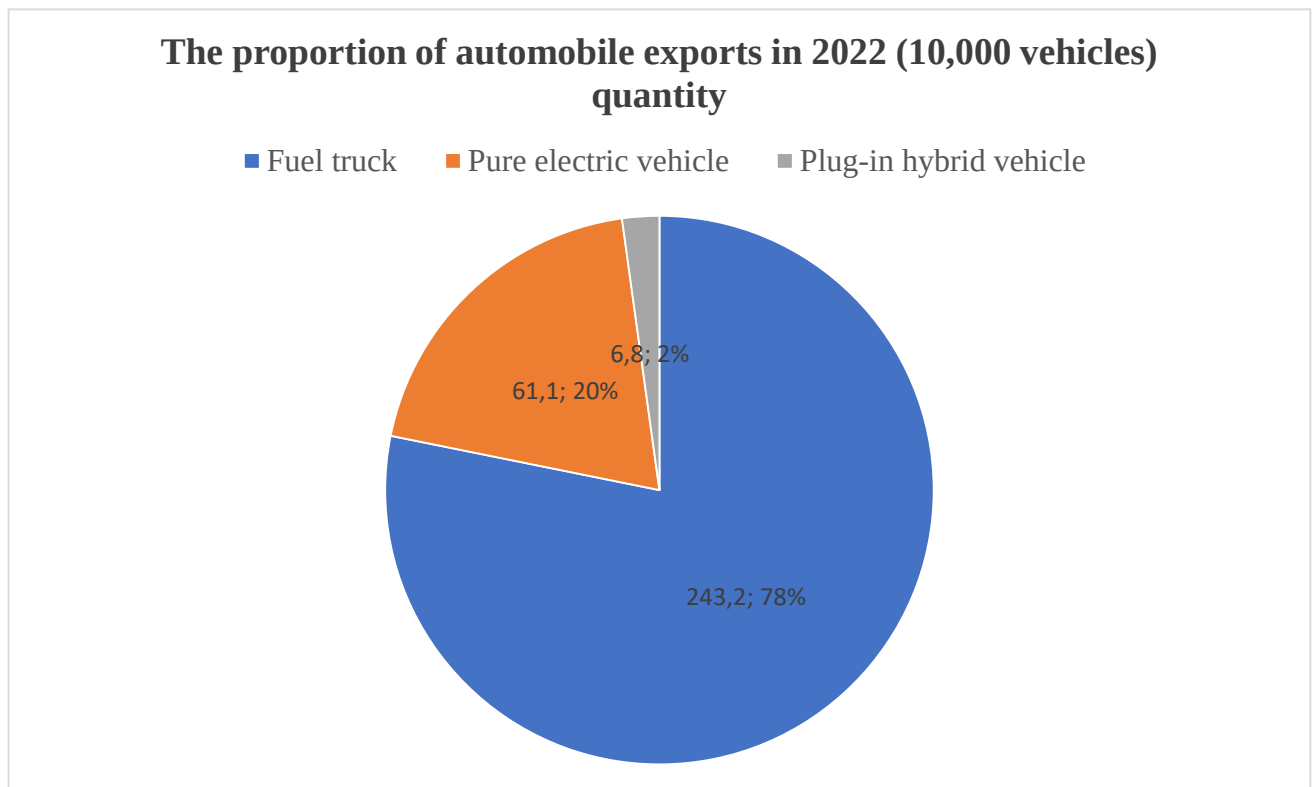


Figure 1.2 – The proportion of automobile exports in 2022 quantity [34]

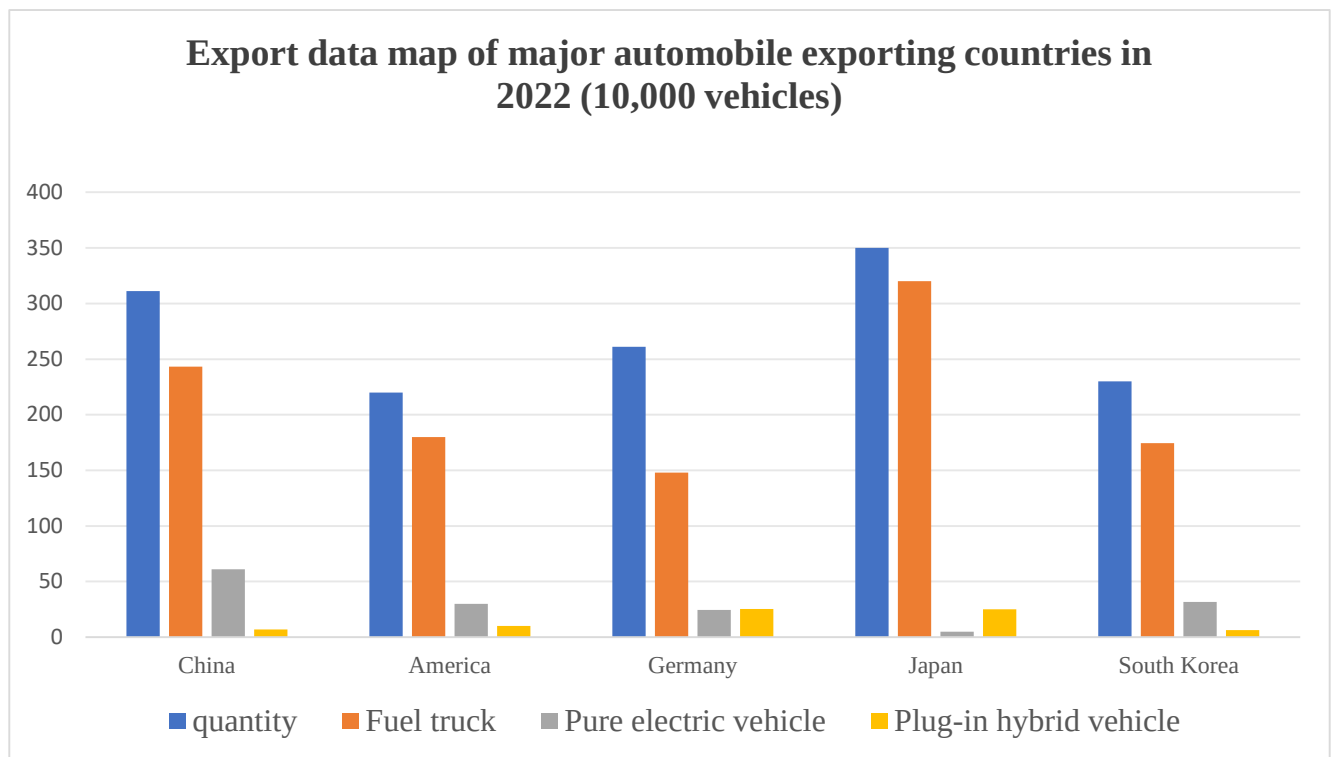


Figure 1.3 – Export data map of major automobile exporting countries in 2022
(10,000 vehicles) [8]

Looking at the export composition of new energy vehicles in China in recent years, it can be divided into pure electric passenger cars, plug-in hybrid cars and non-plug-in hybrid cars. In 2022, among the total export volume of new energy vehicles in China, the export volume of pure electric passenger vehicles accounts for 89 %, which has an absolute advantage. Plug-in hybrid cars accounted for 9 % of the total, ranking second. With the continuous expansion of the new energy vehicle market, the demand for pure electric buses and hybrid buses has gradually increased, and the new energy vehicle market has begun to March into the field of public transportation.

The export market of new energy vehicles in China is characterized by unbalanced regional distribution, mainly in economically developed countries in Europe and Asia. China's largest export market is Asian countries, especially Southeast Asian countries. Due

to the importance attached to environmental protection and the need of economic development, the demand for new energy vehicles has gradually increased, among which India and Bangladesh account for a relatively high proportion. After the implementation of the fuel ban in European countries, the demand for new energy vehicles has increased year by year. According to statistics, Belgium, Britain and the Philippines will become the three major export markets of new energy vehicles in China in 2022. Although the proportion of countries in North America, Oceania and Africa in China's new energy vehicle export market is small, the acceptance of new energy vehicles in North America market is gradually increasing, especially in the United States and Canada, which can become one of the main directions of market expansion in the later period.

The China Municipal Government has issued a series of policies to support and encourage the export of new energy automobile enterprises in China:

1 Export subsidy policy: China government provides subsidies for new energy automobile exporters to reduce their export costs and improve their export competitiveness.

2 Export credit support. The China Municipal Government encourages banks to provide export credit support for new energy automobile exporters to help them expand overseas markets.

3 Preferential tax policies: China implements preferential tax policies on value-added tax and enterprise income tax for new energy automobile export enterprises.

4 Export credit insurance support: China government provides risk protection for the overseas business of new energy automobile export enterprises through export credit insurance.

5 Overseas marketing support: China Municipal Government encourages and supports

new energy automobile enterprises to participate in international exhibitions and carry out overseas marketing promotion activities.

6 Overseas investment support: China government supports new energy automobile enterprises to set up production bases and R&D centers overseas to enhance their competitiveness in overseas markets.

The implementation of these policies has effectively promoted the export business of China's new energy automobile enterprises and enhanced the influence of China's new energy automobile in the global market.

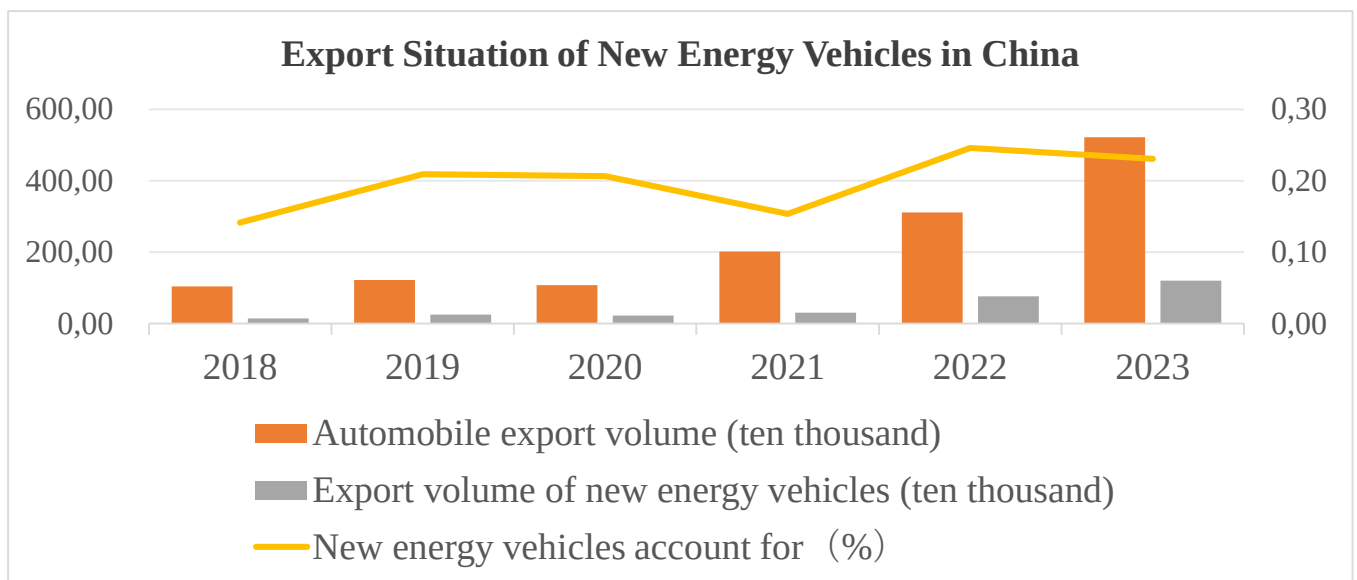


Figure 1.4 – Export Situation of New Energy Vehicles in China [27]

In recent years, the import of new energy vehicles in China has shown a rapid growth trend. In 2021, the import of new energy vehicles in China reached about 1.78 trillion vehicles, up about 80 % year- on- year. The main importing countries include the United States, Germany and Japan, among which the United States and Germany occupy a dominant position.

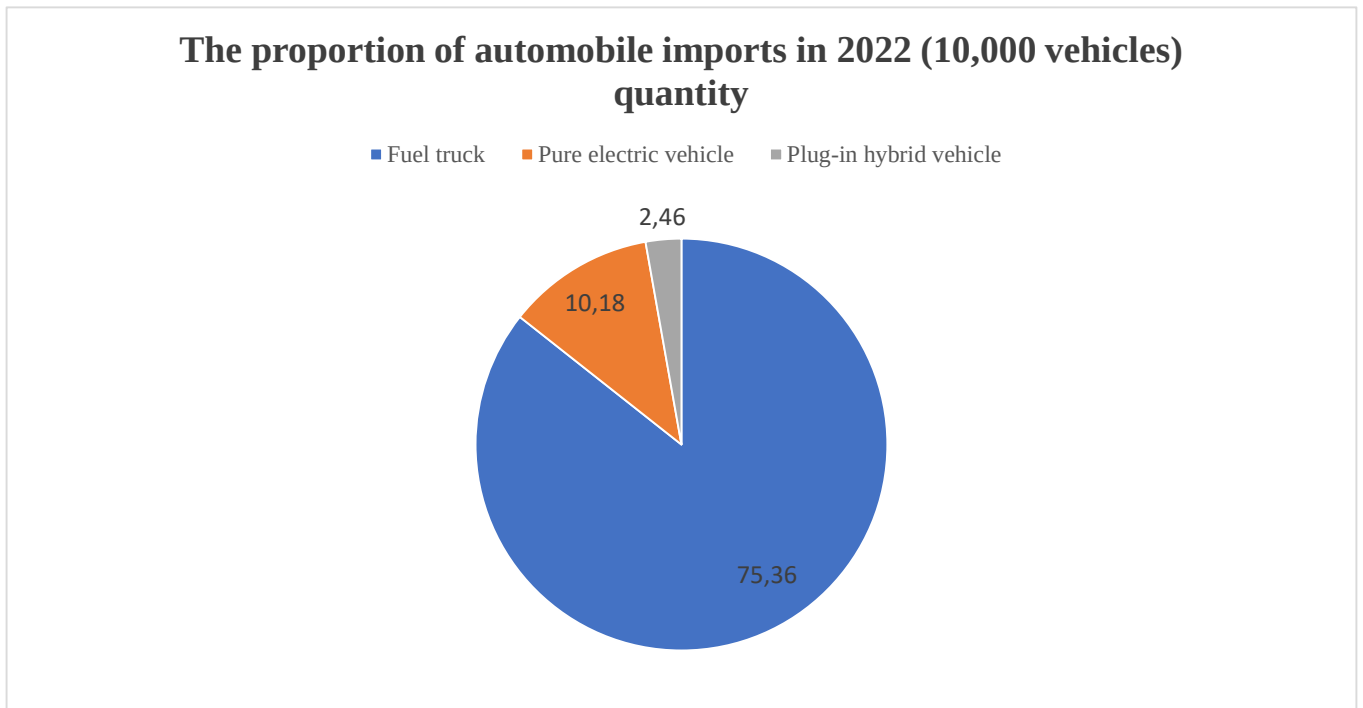


Figure 1.5 – The proportion of automobile imports in 2022 (10,000 vehicles) quantity
[32]

From the perspective of vehicle structure, imported new energy vehicles are mainly pure electric vehicles, and plug-in hybrid vehicles account for a relatively low proportion. From the perspective of price structure, the import of high-end new energy vehicles accounts for a relatively high proportion, such as luxury brand models such as Tesla and Porsche.

In terms of imported brands and import price structure, Tesla is the most important brand of imported new energy vehicles in China, occupying most of the import market share. Other imported brands include luxury models such as Porsche, BMW and Mercedes-Benz, and the proportion of low-end imported new energy vehicles is relatively small.

At the same time, some major policies and measures of China government on the import of new energy vehicles have also changed. In recent years, China government has

gradually adjusted and reduced the purchase subsidies of new energy vehicles to promote the independent development of the industry. In 2022, China cancelled the purchase subsidies for imported new energy vehicles, and only provided subsidies for domestic new energy vehicles.

The foreign investment access policy has been tightened. In order to protect the local new energy automobile industry, China has raised the threshold for foreign investment access and strengthened the control over foreign-funded enterprises. In 2021, China lifted the restrictions on foreign-funded shares in the field of new energy vehicles, but still required foreign-funded enterprises to set up wholly-owned or joint ventures in China.

With the improvement of safety certification standards, China has strengthened the safety certification and supervision of imported new energy vehicles and improved the access standards. In 2021, China issued stricter safety technical specifications for new energy vehicles, which put forward higher requirements for imported models.

Technological innovation incentive policy, China has issued a series of policies to encourage local new energy automobile enterprises to increase investment in technological innovation and enhance their independent innovation capability. Such as providing R&D subsidies and tax incentives to promote the development of local industries.

Charging infrastructure construction: China has invested heavily in the charging infrastructure construction of new energy vehicles to provide better supporting for local new energy vehicles. This also limits the development space of imported new energy vehicles to some extent.

Generally speaking, the government of China is supporting and protecting the local new energy automobile industry through various policies and measures, which has put

some pressure on the development of imported new energy vehicles.

1.2 BYD and Tesla's international trade strategy and status comparison

BYD Company was founded in 1995, which was mainly engaged in battery business. In 2003, he began to set foot in the automobile manufacturing business and successfully went public in 2008. In 2010, BYD began to promote new energy vehicles on a large scale and became one of the leading enterprises in the new energy vehicle industry in China. BYD is mainly engaged in automobile, mobile phone, battery and other businesses. It is the largest manufacturer of new energy vehicles in China, and owns several automobile brands such as BYD brand and Tengshi brand. In the field of new energy vehicles, BYD has a layout in pure electric vehicles and plug– in hybrid vehicles. In recent years, BYD's sales of new energy vehicles have increased rapidly, and it has become a major participant in China's new energy automobile market. However, due to the epidemic situation and other factors, the overall sales volume of BYD will decline in 2020. In the future, BYD will continue to increase the R&D and promotion of new energy vehicles and consolidate its leading position in China's new energy automobile market [1, p. 57].

In recent years, BYD's sales have increased year by year, from 490,000 vehicles in 2018 to 3 million vehicles in 2023. In the first three quarters of 2022, BYD sold more than 1 million new energy vehicles, becoming the world's largest new energy vehicle enterprise. Among them, the sales of pure electric vehicles accounted for more than 90 %, and the performance was excellent.

Technical strength: BYD is in the leading position in core technologies such as power

battery and motor control. New technologies such as self– developed blade batteries and lithium iron batteries are widely praised.

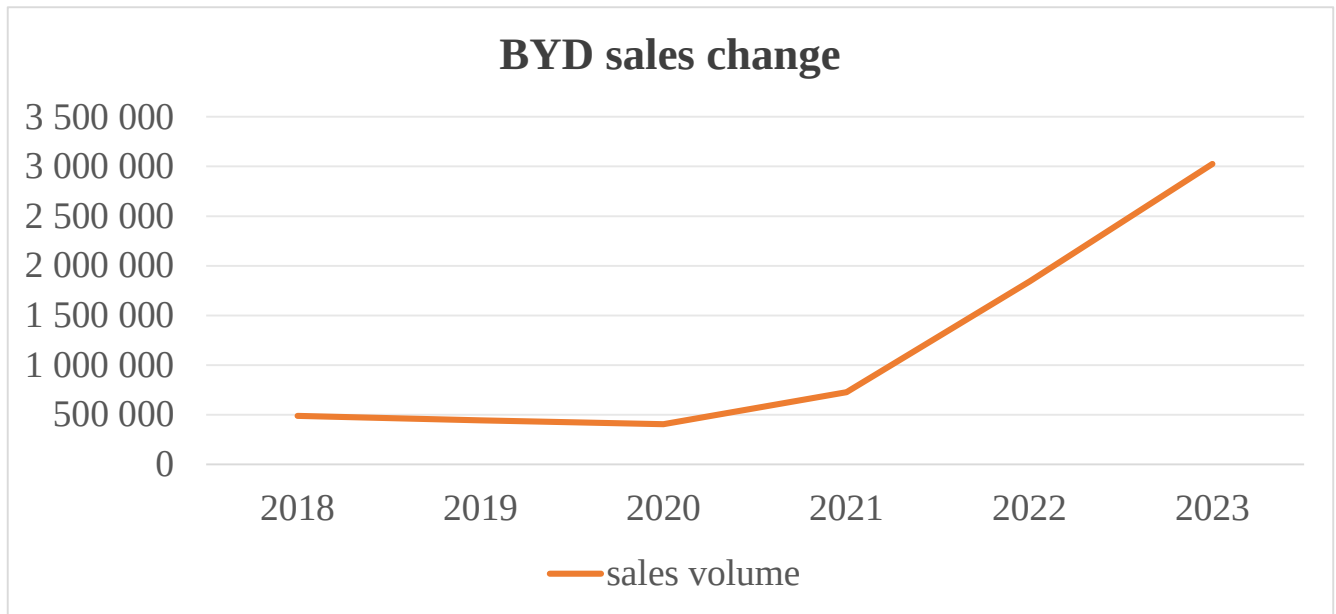


Figure 1.6 – BYD sales change [2]

Product layout: BYD has a comprehensive product line layout in pure electric passenger cars, commercial vehicles and other fields. Sales of flagship models, such as Han EV and Tang DM, continue to climb and are favored by consumers. In the future, BYD will continue to focus on the field of new energy vehicles, increase investment in technological innovation, and actively expand overseas markets, striving to become the world's leading new energy vehicle enterprise.

BYD Auto has developed rapidly in the world market, and its major overseas markets outside China include Europe, South America and Southeast Asia. We have established production bases or sales networks in Brazil, Colombia, Chile, Norway, Denmark and other countries [43, p. 7].

In recent years, BYD's sales in overseas markets have shown a rapid growth trend. In 2021, BYD sold more than 100,000 new energy vehicles in overseas markets, accounting for about 30 % of its global sales.

At the same time, BYD has strong strength in new energy technologies and battery systems, and has begun to export related technologies to overseas car companies. For example, it has reached cooperation with Toyota and Hyundai to jointly develop new energy vehicles. BYD is actively promoting its brand image and conducting brand promotion and marketing activities in overseas markets.

It is hoped that BYD's popularity and influence in the global market will be further enhanced through the improvement of product strength and service.

Generally speaking, BYD is accelerating the pace of globalization, and its sales volume and brand influence in overseas markets are gradually improving. In the future, its overseas business is expected to become one of the company's important growth engines.

Tesla is an American electric vehicle manufacturer headquartered in California, founded by elon musk in 2003, and is one of the most famous new energy vehicle companies in the world. Tesla currently mainly produces four Model S: Model S, Model X, Model 3 and Model Y. These models are all pure electric vehicles, and their cruising range and performance are at the leading level in the industry. In addition, Tesla also plans to launch Cybertruck electric pickup trucks and semi electric trucks [26, p. 33].

Tesla has advanced technologies in battery technology, motor drive and autonomous driving. Its battery energy density and cruising range are leading in the industry, and it is also in the forefront in terms of automatic driving function. Tesla occupies a dominant position in the global new energy vehicle market, and its sales volume continues to grow

at a high speed. In 2021, Tesla sold more than 930,000 vehicles worldwide and became the world's largest pure electric vehicle company.

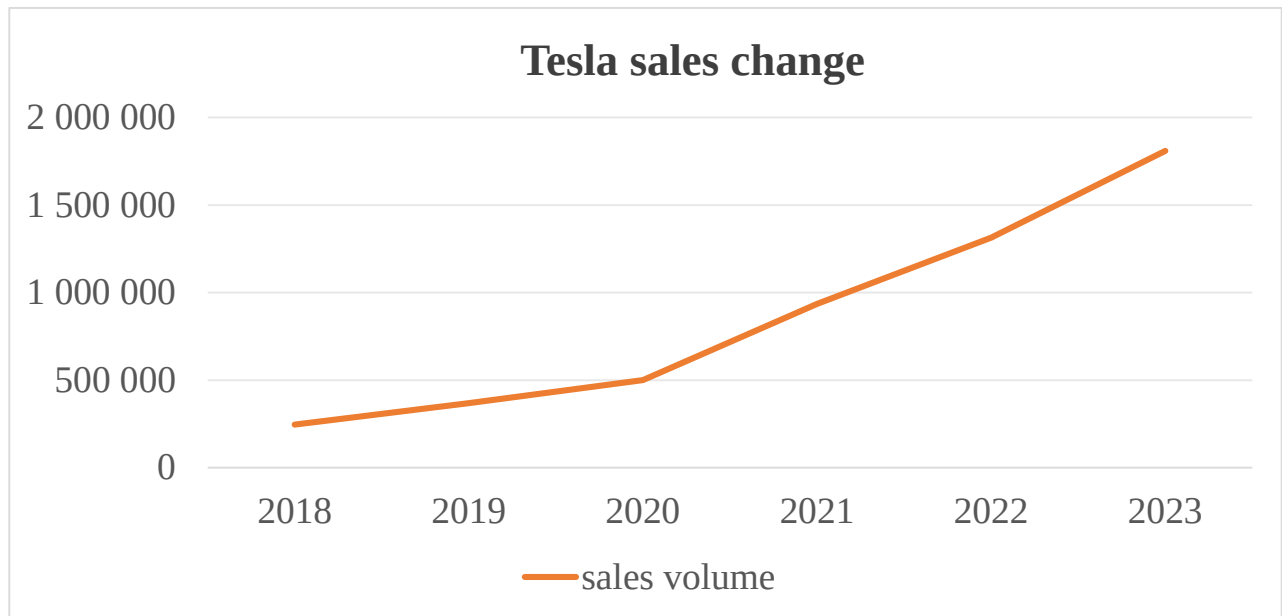


Figure 1.7 – Tesla sales change [33]

Tesla's share price has also soared in recent years, and its market value has exceeded \$1 trillion, making it the world's most valuable car company.

Tesla occupies a dominant position in the global new energy vehicle market, and its sales continue to grow at a high speed. China is an important overseas market for Tesla, and its sales in China account for nearly half of its global sales. Tesla has a production base in China, and its products are favored by consumers in China. Europe is Tesla's second largest overseas market, with sales accounting for about 30%. Tesla's sales performance in Norway, Germany, the Netherlands and other countries is particularly outstanding.

Tesla has become the benchmark and leader of the global new energy automobile industry. Its avant- garde design, excellent performance and innovative technology have

continuously enhanced its brand influence. Tesla plans to further expand its global production capacity and continuously improve its technical level. At the same time, it is actively expanding its business in overseas markets such as China and Europe to consolidate its leading position in the industry. In general, Tesla has performed well in the global new energy vehicle market and has become a leading enterprise in the industry, with broad prospects for future development.

Differences in international trade strategies between BYD and Tesla;

The first is the market layout. Tesla is mainly concentrated in North America, Europe and China, where the new energy vehicle market is mature. BYD, on the other hand, dominates the domestic market in China and is also expanding overseas emerging markets.

In terms of production base, Tesla has set up production plants in China, the United States and Europe to produce and supply the local market nearby. BYD mainly relies on China's domestic production base and exports to overseas markets.

In terms of pricing strategy, Tesla's pricing in different markets is relatively uniform, focusing on high– end positioning. BYD adopts a more flexible pricing strategy in different markets, targeting different consumer groups.

In terms of sales channels, Tesla mainly sells through its own sales outlets and online channels. BYD relies more on local dealers and agents for sales.

In terms of technology output, Tesla pays more attention to protecting its own technological advantages and is not easy to export.

BYD, on the other hand, is more willing to cooperate with local enterprises and share technology.

Generally speaking, Tesla pays more attention to the globalization strategy, focusing

on high– end positioning and independent sales; BYD, on the other hand, pays more attention to localization and relies more on local partners. The two companies have adopted different strategies on the road to internationalization.

From this, we further expand into the new energy vehicle market in China, and analyze the development characteristics of new energy vehicles in China.

From 2018 to 2022, China's trade volume grew steadily. Although the export volume of the automobile industry was affected during the epidemic, the growth was still rapid. The new energy vehicles increased by more than 60 times in five years, reaching 229.07 trillion US dollars. China Municipal Government has issued a series of policies to support the development of new energy vehicles, including subsidies, tax incentives and infrastructure construction. These policies have provided strong support for the rapid development of the new energy vehicle market [12, p. 16].

China is the world's largest consumer market for new energy vehicles, and consumers have a high acceptance of new energy vehicles. Especially in first– tier cities, the proportion of sales of new energy vehicles has increased significantly.

BYD, Tucki, Weilai and other local new energy automobile brands in China have risen rapidly and made rapid progress in technology, products and sales. These local brands are challenging the position of international brands such as Tesla in the China market.

China has a strong industrial chain advantage in the core components of new energy vehicles such as power batteries and motors. This has provided important support for the development of local new energy automobile enterprises in China.

China is speeding up the construction of charging infrastructure for new energy vehicles, creating favorable conditions for the popularization of new energy vehicles. This

has also become an important support for the development of new energy vehicles in China.

Generally speaking, driven by the advantages of policies, markets and industrial chains, China's new energy vehicles are in a stage of rapid development and have broad prospects for future development.

On the other hand, in terms of the international new energy vehicle market, the policy support of other countries in the world is relatively weak. China is the world's largest consumer market for new energy vehicles, with strong demand. However, the demand growth in Europe, the United States and other markets is relatively slow.

China local new energy automobile brands, such as BYD and Tucki, have risen rapidly and have strong competitiveness in technology, products and sales. Local brands in other countries are relatively weak and it is difficult to compete with international brands such as Tesla.

In terms of industrial chain and infrastructure construction, China has strong industrial chain advantages in core components such as batteries and motors, while other countries have relatively weak industrial bases in these fields. China is building the charging infrastructure of new energy vehicles on a large scale, while other countries are lagging behind in this respect.

Generally speaking, thanks to the advantages of policy support, market demand and industrial base, the development speed of new energy vehicles in China is obviously faster than that in other parts of the world. This also makes China an important engine for the development of new energy vehicles in the world.

BYD and Tesla, as the world's first-class new energy automobile enterprises, their development can reflect the situation of China and the world's new energy automobile

market to a certain extent and analyze the reasons. The following will further analyze the future development trend of China's new energy automobile from the market position and prospect forecast of BYD and Tesla.

Market share, Tesla occupies a dominant position in the global new energy vehicle market. In 2022, Tesla accounted for more than 20 % of global new energy vehicle sales. And BYD occupies a leading position in China's new energy vehicle market, with BYD accounting for more than 30 % of China's new energy vehicle sales in 2022.

With technical strength, Tesla is at the leading level in core technologies such as batteries, motors and autonomous driving. BYD also has strong strength in battery and motor technology, and has made a major breakthrough in the field of power batteries.

Brand image: As a "pioneer" and "benchmark" in the field of new energy vehicles, Tesla enjoys a high brand awareness and reputation worldwide. Although BYD has a dominant position in China market, its brand influence in overseas markets still needs to be further improved.

Market strategy, Tesla mainly focuses on the high– end electric vehicle market, pursuing the ultimate performance and user experience. BYD also has strong competitiveness in the low– end market and actively expands overseas markets.

At present, Tesla and BYD have their own advantages in the new energy vehicle market, and they are in a fierce competition situation. In the future, the two sides will continue to compete in technological innovation and market expansion.

According to the analysis of BYD, the future development trend is predicted as follows:

Technological innovation continues to lead, and BYD continues to innovate in core

technologies such as power batteries and motor drives, which will further consolidate its technological advantages in the field of new energy vehicles.

With the continuous enrichment of product lines, BYD will continue to expand new energy passenger cars, commercial vehicles and other product lines to meet the needs of different market segments. At the same time, it will also increase the layout in the fields of new energy buses and logistics vehicles.

With the acceleration of international market expansion, BYD will increase its investment and layout in overseas markets, and further enhance its sales and market share in Europe, Latin America and other regions.

Industry consolidation optimization, BYD will continue to promote the vertical integration of the industrial chain, and the advantages of the whole industrial chain from batteries and motors to vehicle manufacturing will be further highlighted.

With the improvement of intelligence level, BYD will increase its R&D investment in the fields of intelligent network connection and automatic driving to improve the intelligence level of products and meet the needs of consumers.

Driven by the goal of carbon neutrality, BYD will take the goal of carbon neutrality as an important driving force for its future development, continuously optimize its product structure, and improve energy efficiency and sustainability.

Generally speaking, with the advantages of technological innovation and quick market response, BYD is expected to maintain its strong competitiveness and continue to expand its market share in the future new energy vehicle market.

According to the analysis of Tesla, its future development trend is predicted as follows:

Technology leadership continues, and Tesla will maintain its leading position in the core technology fields such as batteries, motors and autonomous driving, and continue to promote product performance improvement.

With the acceleration of global market expansion, Tesla will continue to increase its investment and capacity distribution in major markets such as China and Europe, and further enhance its market share in the global scope.

With the diversified development of product lines, Tesla will continue to enrich its product lines. In addition to existing passenger cars, it will also launch new energy trucks, pickup trucks and other commercial models to meet a wider range of customer needs.

With the continuous upgrading of autonomous driving technology, Tesla will continue to increase its R&D investment in autonomous driving technology and apply this technology to more models to improve the intelligent level of products.

With the continuous optimization of service experience, Tesla will further improve its sales and service network, enhance the user experience and consolidate its leading position in the high-end electric vehicle market.

With the expansion of energy business, Tesla will further expand in the energy fields such as solar cells and energy storage systems to realize the vertical integration of the industrial chain.

Generally speaking, with its technological innovation advantages and global layout, Tesla is expected to maintain a leading position in the future new energy vehicle market and further expand its influence. However, we also need to pay attention to risk factors such as intensified competition in the industry and changes in regulatory policies.

The main factors affecting the different development of BYD and Tesla in the new

energy vehicle market;

Different from enterprise positioning and strategy, Tesla is positioned in the high– end electric vehicle market, focusing on technological innovation and global expansion. BYD has a wide positioning, covering many market segments such as passenger cars and commercial vehicles, and paying more attention to the development of the local market.

Due to the difference in technical strength and R&D investment, Tesla continues to maintain its leading position in core technology fields such as batteries, motors and autonomous driving, and continues to invest heavily in R&D. BYD also has strong strength in some key technologies, but the overall R&D investment is relatively small.

Different in financial strength and financing ability, Tesla, as a world– renowned high– tech company, has strong financing ability and can continuously invest in large– scale R&D and global layout. As a traditional manufacturing enterprise, BYD's financing ability is relatively weak, and its capital investment is limited.

To sum up, the differences between BYD and Tesla in the development of new energy vehicle market are mainly due to the differences in strategic positioning, technical strength, financial strength and market environment of the two companies. In the future, the two sides will continue to compete fiercely in the new energy vehicle market.

1.3 The impact of China's new energy vehicles on China's international trade

The international situation is changing and trade protectionism is on the rise. The trade friction between China and the United States has become increasingly fierce. Anti– globalization and trade protectionism have led to a turbulent international trade situation.

The better development and going out of China's new energy vehicles have had the following effects on China's international trade [29, p.45]:

From 2018 to 2022, the trade volume of China increased steadily. Although the export volume of the automobile industry was affected during the epidemic period, the growth was still rapid. The new energy vehicles increased by more than 60 times in five years, reaching 229.07 trillion US dollars. With the rapid development of China's new energy vehicle industry, China has become the largest producer and exporter of new energy vehicles in the world. The export of new energy vehicles in China is gradually increasing, which has become an important part of China's automobile export and has a positive impact on China's overall export trade.

The technical level of new energy vehicles in China has been continuously improved, which has replaced imported new energy vehicles to some extent and reduced the related import demand. This will help improve China's trade surplus and reduce its external dependence.

The rapid development of new energy automobile industry has promoted the development of upstream and downstream industrial chains, such as the production and export of key components such as power batteries and motors. This has further enhanced the overall competitiveness of China's new energy automobile industry chain.

The continuous progress of new energy vehicle technology in China has also promoted the international transfer and diffusion of related technologies.

The rapid growth of the new energy vehicle market in China has attracted a lot of investment and cooperation from international capital and enterprises. This will help to further improve and internationalize the industrial chain of new energy vehicles in China.

Generally speaking, the rapid development of China's new energy automobile industry has had a positive impact on China's international trade pattern, which is helpful to enhance China's position and voice in the global new energy automobile industry chain.

Chapter 2 Analysis on Influencing Factors of New Energy Vehicle Production and International Trade in China

2.1 Analysis of the External Environment of New Energy Vehicle Enterprises

The role of the automobile industry in the national economy is self-evident. The development of the industry is closely related to economic growth and social development. The faster and higher the development level of the new energy automobile industry, the stronger China's voice in the automobile industry and the higher its international influence. Reducing energy consumption and better protecting the environment play a vital role in the optimization of energy structure and economic transformation. We should introduce relevant policies and systems based on national energy security, environmental protection and other aspects, and continuously strengthen support for the development of new energy vehicles and market practice.

The China government has attached great importance to the development of the new energy automobile industry and has taken a series of measures to support it.

Policies to promote the growth of the industry. For example, a special fund for the promotion and application of new energy vehicles has been launched through the central government, covering charging infrastructure subsidies, research and development subsidies and car purchase subsidies, with the aim of attracting more consumers to adopt new energy vehicles. Further, the government has implemented the "double points" policy and specified the proportion requirements for sales of new energy vehicles in the "14 th Five-Year Plan", set specific targets for automobile manufacturers' sales of new energy vehicles in the next

five years, and formulated detailed sales, technical protection standards for the industry [21, p. 38].

These policies and measures have provided solid policy support for enterprises in the new energy automobile industry and promoted their rapid development in the China market. Under the background of increasingly tight global energy supply, reducing dependence on oil has become an international consensus. As a substitute for traditional fuel– fired vehicles, new energy vehicles not only highlight their advantages in promoting sustainable development, but also accord with the government's strategic intention to promote new energy industry to meet energy challenges [14, p. 30].

In the past six years, China's gross national income and gross domestic product have become higher and higher, and the three major industries have developed well. In 2023, the total economic volume reached More than \$18 trillion. According to the data from the National Bureau of Statistics, China's gross domestic product in 2023 exceeded 1,260.58 billion yuan. China has withstood external pressure and overcome internal difficulties, and the national economy has recovered well. It has made solid progress in high– quality development, and its major expected goals have been successfully achieved. The per capita GDP and per capita disposable income are increasing, and the economic development is relatively good. Under the tight world economy after the COVID– 19 epidemic, China's economic development is still in an orderly way. With the economic development momentum becoming stronger and stronger, the market potential of new energy vehicles is greater.

According to the China Foundation, China's total economic output in 2023 reached more than 126 trillion yuan, an increase of 5.2 % as compared with the previous year. All

in all, the new energy automobile industry is developing faster and faster, and the enthusiasm and passion of consumers are also getting higher and higher. It strongly supports the development of domestic automobile enterprises, with a good market environment, fairness and justice, and orderly competition.

In 2021, at the National People's Congress and the National People's Congress, the government work report for the first time referred to the "peak carbon dioxide emissions, carbon neutral" wording, which proposed that China should achieve a peak carbon dioxide emission and carbon neutral by 2030 and by 2060. At this stage, the level of industrialization in China is getting higher and higher, with high consumption and carbon emissions. It is necessary to further promote a brand– new and environment– friendly industrial production model, and the optimization of energy and industrial layout is imminent. In this case, the new energy vehicle is a symbol of environmental protection and low carbon, which is conducive to the realization of a qualitative leap in the automotive industry in China and plays a vital role and influence in high– quality growth. More and more consumers are beginning to favor and choose new energy vehicles as their only choice. The initiative of "green development and low– carbon travel" puts forward the goal of "carbon neutrality and peak carbon dioxide emissions". People are more and more fond of new energy vehicles. The market prospect of new energy vehicles is bright [35, p. 33].

At present, the development of lightweight technology for new energy vehicles focuses on four core areas: lightweight design and construction, enhancement of vehicle body rigidity, application of high– strength steel and application of advanced forming technology. The continuous upgrading of technology has made the simulation optimization technology of lightweight structural design rapidly progress. In recent years, interdisciplinary design

optimization technologies such as functional safety assessment (SFE) and interdisciplinary optimization design (MDO) have been widely used. At the same time, the power battery technology has also made rapid progress. In terms of endurance and battery safety, both at home and abroad have reached a new level. For example, Dongfeng Company's new battery has reached a brand– new range. Its energy density and range are 230 W h/kg and 1000 km. In 2022, the 11th Science and Technology Conference of Guoxuan Hi– Tech publicly stated that China would produce ternary semi– solid– state batteries with an energy density of 360 W h/kg in the next step.

At home, Honeycomb Energy and BYD Auto are all enterprises with rapid development of power battery technology. In order to further guarantee the performance of the battery, Honeycomb Energy has introduced the short– blade battery technology, which greatly improves the production efficiency through hot– pressing and multi– layer stacking of electrode sheets. Compared with the traditional stacking process, the investment cost per kWh is reduced by 30 %, and the required land area is reduced by more than 40 %. In addition, compared with the winding process, the volume expansion rate of the battery using the lamination process is expected to be reduced by more than 40 % after long– term recycling, and the service life of the battery is increased by 10 %. BYD, by its original blade battery technology, has made a "blade" shaped battery cell with a slender shape, and can realize personalized customization as long as the battery pack is referenced. The assembly process of the blade battery does not need a "module", the battery pack is directly formed, and the space utilization rate is greatly improved. The energy density of the blade battery is 180 W h/kg, which is significantly increased by 9 % as compared with the conventional modular battery pack.

2.2 SWOT Analysis of BYD

Since its establishment, BYD Co., Ltd. has been adhering to the principle of independent innovation. After decades of development, it has made remarkable achievements in the core technology in the field of new energy vehicles. The company's independent research and development of key technologies such as engines, transmissions and control software not only demonstrates its determination in technological innovation, but also ensures its core competitiveness in the highly competitive new energy vehicle market [20, p. 56]. As of February 2024, BYD has obtained 169 new patent licenses. BYD has led the product advantage through scientific and technological innovation. At present, it has set up 11 research institutions, filed more than 40,000 patent applications globally and has obtained more than 28,000 patent licenses. The Company has promoted the development of various related technologies, which have brought great help to this field, including cloud chariot system, E platform 3.0, blade battery, Easy Quad, DM– i super hybrid, DMO super hybrid off– road platform, etc. [1, p. 32].

BYD has actively entered the global market and rapidly expanded its international footprint of new energy passenger cars by adopting both export and local production strategies. Up to the end of 2023, BYD has sold its own new energy vehicles in 58 countries and regions such as the United States and the United Kingdom. Moreover, the sales volume of vehicles has already exceeded 200,000, and it has successfully occupied the market of new energy vehicles in Thailand, Brazil and other countries, and is in a leading position that is difficult to surpass. BYD held large– scale automobile exhibitions in Munich and Tokyo,

Germany. During the exhibitions, many new series of automobile models were exhibited, such as "Han", "Seal" and "Dolphin", which are all familiar to people. These exhibitions not only attracted the attention of BYD automobile, but also attracted the attention of more and more foreign customers. BYD, together with many domestic brands, has entered the eyes of consumers all over the world and is leading the world's automobile industry towards the new energy era. In December 2023, BYD took the lead in building a passenger car factory, the first case in China. In February 2024, BYD and ARVAL signed a memorandum of understanding on strategic cooperation and formally established a strategic cooperation relationship. This has further promoted the localization process of BYD in the European market [3, p. 33].

The rapid development of the new energy automobile industry in China is largely due to the government's "milk– feeding" subsidy policy. For example, the official of Xi 'a City's Bureau of Industry and Commerce announced the "Publicity of BYD Automobile Co., Ltd. Applying for the Promotion and Application of New Energy Vehicles Subsidy for 2020–2022 in capital settlement". It indicates that BYD (002594.SZ) has settled the central financial subsidy for the promotion of new energy vehicles that meet the reporting requirements from 2020 to 2022. The total number of vehicles covered by the application was 806,791, involving an amount of 6,666 million [38, p. 20]. For the past 13 years, government subsidies have been the main driving force behind the development of new energy car companies. According to the announcement made by the Ministry of Finance and the Ministry of Industry and Information Technology at the end of 2021, the state stopped granting a series of related subsidies to new energy vehicles at the end of 22 years. This means that the relevant policy of "plug– in hybrid cars at RMB4800 per vehicle and

pure electric cars at RMB126,600 per vehicle" has officially lapsed [49, p. 15].

Although new energy vehicles have been vigorously promoted by the government in some areas, for some non-first-tier cities or some cities with unlimited license plates, new energy vehicles are not just needed. In these cities, fuel-fired vehicles are still the main means of transportation due to their convenience in refueling. At the same time, the charging facilities of new energy vehicles are relatively few, and the issue of vehicle endurance is also the focus of consumers' attention. In addition, as a new industry, the core technology, safety and convenience of new energy vehicles still need to be improved, which directly affects the public's acceptance of new energy vehicles. With the increase of automobile e-commerce platforms, the rise of second-hand car market also weakens the sales market of new energy vehicles. The poor performance of new energy vehicles in the used car market is mainly due to the lack of mature testing standards, standards and professional testing institutions, as well as the problem of battery loss, reduces the market attraction of new energy vehicles [36, p. 73].

With the gradual opening up of the auto market in China, BYD is expected to further explore the international market. As a leader in the new energy vehicle market, BYD's market share and brand are also growing in the international market, especially in the European market. It will be an important direction for BYD's business expansion to fully grasp global resources, strengthen international market development and gain more international market share. The China government has issued a series of supporting measures in the aspects of environmental protection and energy security, and has attached great importance to the development of new energy vehicles, which will provide favorable opportunities for the development of enterprises. Coupled with the rapid development of

global green industry, BYD's main business is public service and energy supply, which opens up a wide development space. BYD has high technological advantages in new energy vehicles and green technologies, which can bring more technological innovations and leading products in the future and further explore the market. For example, in-depth research has been carried out in the field of basic materials research to develop new materials with great potential, which has successfully provided good technical support for industries such as electric vehicles and lithium batteries [24, p. 83].

In 2022, Tesla and BYD sold 550,000 vehicles, while in 2023 the gap widened to 1.21 million vehicles. So far, in 2023, BYD has sold 3.024 million new energy vehicles, locking in the position of the world's champion in sales of new energy vehicles. According to the official data of BYD, in January 2024, the sales volume of BYD's passenger cars exceeded 200,000, up 33.9 % year-on-year. Among them, BYD's passenger car exports reached 36,174, representing a year-on-year increase of 247.5 %. So far, BYD's sales volume of new energy vehicles has exceeded the 6.5 million marks. In 2024, BYD ushered in a comprehensive replacement. At present, the main sales models, such as Qin PLUS, Han DM-i/ Han EV and Tang DM-i, all use the platforms of the old models. With the concept of "better flat platform made exclusively of pure electricity" and "better front double wishbone rear five-bar suspension" deeply rooted in the hearts of the people, BYD needs more new platform models such as Song L and Seal. BYD can continue to develop only by upgrading its models in an all-round way and replacing them with more advanced platforms to improve the overall mechanical quality of the vehicles.

In 2023, BYD exported a large number of electric vehicles, such as Israel (15000), Brazil (18000) and Thailand (30000). BYD once again beat Tesla by a significant margin,

becoming the fastest- growing brand on the podium with a year- on- year growth rate of 56 %. In 2024, BYD's growth space in the China market will be relatively small, and overseas markets will be the new sales growth point of BYD's brand.

In 2024, BYD will make a big bet on overseas markets, and factories in Brazil and Thailand will go online. At present, the heat in the new energy vehicle market has not decreased, more and more domestic and foreign enterprises have joined the market, and the market share of some brands has been increasing. For example, on March 28, 2024, Xiaomi su 7 announced that it would sell 50,000 vehicles in the 27 th minute, further "agitating" the domestic new energy vehicle market, which has created tremendous competitive pressure on BYD. These competitive pressures also come from the joining of other international and domestic automobile brands, and the government's requirements on urban air quality and vehicle emission reduction have become higher.

Other internationally renowned auto giants are continuously joining the market of new energy vehicles, and they continue to invest a large amount of money in research and development. BYD is currently facing the competition challenge from these companies, because these auto giants often have rich experience in building fuel- fired vehicles and will make a lot of money on new energy vehicles. The technological advantages and brand influence of these foreign giants are obvious, which provides them with significant advantages in brand recognition and market share. In the current international economic environment, the trend of globalization is increasingly obvious. With the rapid development of China's economy, the active participation of foreign- funded enterprises in the China market has increased significantly, especially in the field of new energy electric vehicles. These enterprises have gained the first- mover advantage by virtue of their early market

entry. Facing this situation, BYD will strengthen its cooperation and exchange with international advanced automobile enterprises and share its core technology and innovation experience, so as to enhance the competitiveness and technological level of China automobile enterprises in the global market.

As the new energy vehicle is still in the early stage of development, its market demand is affected by factors such as individual choices of car consumers, corporate layout issues, government policies and regulations, etc., so the market demand is uncertain. For example, in terms of funds, new energy vehicles often need to obtain more government and private funds to achieve large-scale development. In addition, some technical problems, such as charging problems, life cycle of battery components, charging efficiency, etc., also bring certain challenges to the market of products.

Through comprehensive assessment, BYD has shown its independent intellectual property rights and outstanding competitive advantages in such fields as new energy vehicles, power storage technology, automobile research and manufacturing, new energy technology and rail transportation.

Under the background of increasing global attention to environmental sustainability, BYD, as a cutting-edge new energy enterprise, has won increasing international recognition and recognition for its ability in technological innovation and product research and development. The enterprise not only has a profound technological foundation, but also shows strong strength in the economic and technological fields. However, facing the dual challenges of product market competition and production cost efficiency, BYD still needs to cope with the high degree of market competition and the continuous challenges of new technological innovation [54, p. 60].

2.3 Tesla SWOT Analysis

In the current market of China, the concept of clean energy and environmental protection is gradually taking root in the hearts of the people. This trend has significantly promoted the development of the new energy automobile industry. Tesla's development in the China market has benefited from this trend, especially in obtaining high scores in the assessment of external environmental opportunity factors, which reflects the growing attention of China consumers to environmental protection and green concepts. With its advanced clean energy technology and the promotion of electric vehicles, Tesla is committed to addressing climate change and environmental issues. Its leading position in the automotive industry provides users with low– cost and environmentally friendly energy solutions [37, p. 36].

Advanced innovation and technological advantages. Tesla Company occupies a leading position in the global electric vehicle industry. The core of its competitiveness lies in its leading level of innovative technology. The electric vehicle technology adopted by the company is at the forefront of the industry, especially in the development of battery management system, showing outstanding technological advantages. Tesla uses the 18650– model lithium cobalt acid battery manufactured by Panasonic, which provides excellent stability for Tesla electric vehicles due to its high energy density, high safety and long– life charging characteristics. By comparison, this also clearly shows the relative lag in the global competition for new energy vehicle technology [6, p. 61].

In terms of charging facilities, Tesla has established a complete charging network in

the China market, which is crucial for electric vehicles to enter the new market. Up to December 2023, there have been more than 700 mesh filling stations and more than 2,000 mesh filling piles in the country. Non– Tesla owners of pure electric vehicles can also view the available stations and piles nearby, which can provide 7kW of charging power for vehicles. Tesla vehicles, on the other hand, support a maximum of 21kW of destination charging power, ranging from 0% to 80% for up to 6 hours. This intensive charging network effectively alleviates the charging worries of electric vehicle users and provides solid infrastructure support for Tesla's development in the China market [45, p. 36].

Under the current global and China market environment, Tesla Motor's sales volume is showing a continuous growth trend, accompanied by a steady expansion of its market share. However, Tesla has encountered a significant challenge in its production sector: insufficient production capacity. Although sales continue to climb, Tesla appears unable to meet the growing market demand, mainly due to the high– end technological complexity on which its battery– powered systems rely. In addition, Tesla has chosen to apply new materials in the process of pursuing the diversification of enhancing the safety performance and appearance design of cars. These choices exacerbate the complexity of the production process, resulting in the inability to fully automate production, limiting its production capacity and making it difficult to respond effectively to the growth in market demand.

Tesla has implemented a "zero advertising fee" strategy to reduce its marketing costs, however, costs in production and other related areas are still at a high level. The characteristics of this cost structure are mainly due to Tesla's adoption of advanced battery technology and new materials, which not only limits the full automation of the production process, but also leads to higher raw materials and labor costs. In addition, Tesla's extensive

deployment of supercharging stations and charging facilities in the China market has further increased its financial burden. At the same time, the high- tech components used in Tesla's electric vehicle and its unique powertrain system are also an important factor of its relatively high manufacturing cost, which may eventually be reflected in the market selling price, making its product price higher than the ordinary market level.

At present, the steady economic recovery in China has created a favorable market environment for the new energy automobile industry. China is now the world's largest car market, and China's sales volume in the field of new energy vehicles has increased significantly in recent years. In 2023, the sales volume of new energy vehicles in China reached 9.945 million units, and its market share in the world increased to 31.6 %. At the same time, the residents of China are getting a deeper understanding of environmental protection. People are gradually discovering that new energy vehicles can protect the environment. It is predicted that consumers will be more and more inclined to new energy vehicles, and the development potential of new energy vehicles in the China market will be further enhanced.

Tesla's image of high- end, innovative and environmental protection has been established. Tesla has clearly anchored niche high- end market as its development orientation since its establishment. After years of continuous celebrity publicity and word- of- mouth marketing, Tesla has successfully shaped a high- end, technologically advanced, environmentally friendly brand image in the minds of consumers. Through an in- depth analysis of Tesla's external advantages, it can be found that Tesla's high- end, innovative and environment- friendly image occupies a significant position among many advantages, ranking third. This discovery indicates that Tesla's brand image has provided a solid

foundation and favorable conditions for the development and expansion of its electric vehicle market in China [51, p. 30].

In addition to the US brand, more than 90 % of the auto parts in the supply chain list of domestic Tesla have been made domestically. Except for the core chips and integrated circuits, almost all of the car body parts are made in China. The completion of Tesla's Shanghai– based super factory has further strengthened the supply capacity of the domestic auto market, while at the same time using additional production capacity to export auto products to other overseas countries. It can be said that China has become the focus of Tesla's car production and sales. The strong manufacturing capability in China, combined with Tesla's software advantages, will help Tesla realize the integration of power and computing power. Tesla's global smart electric vehicle and energy storage business will also be tied together, and Tesla will evolve into a digital energy company covering the source network and the storage [44, p.10].

In the China market, Tesla is facing fierce competition from domestic car manufacturers as well as international imported car brands. Domestic brands, relying on their relatively low– price setting, have formed an obvious price competitive advantage for Tesla. At the same time, internationally renowned car brands have adopted a similar high– end positioning strategy to Tesla in the China market. These brands not only enjoy a longer brand history, but also have higher recognition and trust in the eyes of consumers, which is a big challenge for Tesla. On October 24, 2022, Tesla announced that from now on, Tesla in Chinese mainland will be selling Model 3 and Model Y to reduce the selling price. In the past five years, Tesla has not launched any new products for the mass market and still relies on the Model 3 and Model Y models to cope with the increasingly fierce market competition.

During this period, the China market alone added competitive products of the same level, such as BYD Han, Tucki P 7, Changan Deep Blue SL 03 and BYD Seals, which posed a threat to Tesla's market position.

Tesla's continued success largely depends on the continued development of its clean energy technologies. In the automotive market, if the company fails to maintain the environmental friendliness of its products, it will be exposed to the risk of a decrease in the attractiveness of the products and a consequent decrease in operating revenue. Government policies will fluctuate with the development of society, which may affect Tesla's sales, so Tesla's sales are facing potential risks. As the international economic environment changes, consumers may reduce their demand for high– end car models, which will further affect Tesla's future development.

Tesla Corporation is a technology company that provides clean energy and electric vehicles. Tesla's automotive products have unique and leading technologies. At the same time, Tesla enjoys high reputation and popularity in the market and has an excellent management team. Among its shortcomings, it faces challenges from high manufacturing costs and sales volumes, as well as support from government subsidies. However, Tesla still has good room for development if it makes good use of opportunities and responds to threats.

According to PEST analysis, with the strengthening of new energy policies and technological progress in China, the market scale of new energy vehicles is expanding, which brings more opportunities and challenges. It plays an important role in vehicle ecology and energy and environmental sustainability. New energy automobile enterprises should seize the opportunity, make full use of policy support and market opportunities, strengthen research and development of new energy automobile technology, improve its

performance and safety, reduce cost and resource consumption, improve user experience, expand market share, and make new contributions to promote the sustainable development of China. At the same time, enterprises should actively respond to the new energy vehicle policy, improve market competitiveness, promote new technological innovation, enhance brand reputation, strengthen their own strength, and gradually reduce the cost scale of new energy vehicles to capture a larger market share. Enterprises can also respond to changes in the environment by innovating technology and providing appropriate products to meet consumers' demand for new energy vehicles, so as to continuously increase market competitiveness and achieve sustainable development. The situation of new energy automobile enterprises in China market is still relatively ideal. Government support is strong, market potential continues to be released, consumer demand continues to increase, and the level of technological innovation is high, which is conducive to the sustainable and stable development of the new energy automobile industry. However, under the circumstances of increasing market competition and policy changes, new energy automobile enterprises need to continue to strengthen their own technological innovation and optimize product design to improve product quality and safety. At the same time, they need to conduct comprehensive and systematic management of upstream and downstream of the industrial chain, consumers and policies and other aspects to prepare for market changes and policy changes.

According to the SWOT analysis of the two companies, in terms of technological strength, Tesla has more advanced and mature technology, which can provide a better user experience. This is Tesla's advantage. Although BYD also has a good research and development capability, it still lags behind Tesla. Although BYD achieved the leading

position in global sales volume in 2023, it did so in the local market because of its great influence in China. Tesla has a higher brand image in the eyes of international consumers, so it has gained more favor from global consumers. BYD focuses on low– end and mid– end models in the domestic market, leaving no high– quality image for consumers. BYD has strong cost control capability and advantages of economies of scale, and the price of its products is more populist. Although Tesla has an advantage on the product line and the cost can be well controlled, the product price is still on the high side [7, p. 48].

Based on the above analysis, both companies have their own advantages and limitations. With its efforts in brand building through technological innovation, Tesla Company has long positioned itself in the high– end market and won a large number of market shares. However, the high– end market has been somewhat impacted by the impact of economic fluctuations. BYD, on the other hand, focuses more on cost control and technology accumulation, which can increase sales volume very effectively, but needs to strengthen its brand image. Our government's support for the new energy vehicle industry continues, consumers' awareness of environmental protection is also improving, and the market scale of new energy vehicle is still expanding. Therefore, both BYD and Tesla have good development prospects and will play an important role in the new energy vehicle market in the future.

Chapter 3 Future prospects and suggestions

3.1 China New Energy Automobile Industry Development Trend Forecast

With the continuous improvement of global environmental awareness and the urgent need for energy transformation, the new energy vehicle market is welcoming unprecedented development opportunities. As an important part of new energy vehicles, the market demand of different types of new energy vehicles shows different growth trends.

The market demand for pure electric vehicles continues to grow. With the continuous progress of battery technology and the increasingly stringent environmental regulations, the cruising range, charging convenience and performance of pure electric vehicles have been significantly improved. In the field of cities and short-distance travel, pure electric vehicles are gradually becoming the first choice for consumers because of their environmental protection and low cost. With the rapid development of private cars, shared trips and logistics vehicles, the market demand for pure electric vehicles will continue to expand [46, p. 118].

The market demand for plug-in hybrid electric vehicles is gradually rising. Plug-in hybrid electric vehicle combines the advantages of fuel vehicle and pure electric vehicle, which can not only meet the needs of long-distance travel, but also maintain low energy consumption in daily travel. With consumers' attention to environmental protection and energy saving, the market demand for plug-in hybrid vehicles will continue to grow. In long-distance travel, urban-rural fringe and other scenes, plug-in hybrid electric vehicles have broad application prospects [15, p. 182].

The market demand potential of fuel cell vehicles is huge. Fuel cell vehicle is the future development direction of new energy vehicles, and its characteristics of environmental protection, high efficiency and long cruising range make it an important choice for future transportation. With the continuous breakthrough of fuel cell technology and the gradual reduction of cost, the market demand of fuel cell vehicles will continue to grow. Especially in the field of commercial vehicles, such as urban buses and long– distance trucks, the application prospect of fuel cell vehicles is broad.

In the new energy vehicle market, consumers' preference and acceptance are important indicators to measure market potential and future trends. With the improvement of environmental awareness and the transformation of energy structure, new energy vehicles are gradually favored by consumers.

In terms of consumers' preferences, with consumers' recognition of the concept of environmental protection and energy saving, the environmental performance of new energy vehicles has become an important consideration for them to choose to buy. When buying a car, consumers will pay attention to the power source, cruising range and charging facilities of the vehicle. With the richness and diversity of the new energy vehicle market, consumers also put forward higher requirements for the performance, appearance and comfort of vehicles. For example, some consumers pursue accelerated performance and driving passion, and will choose high– powered models; Other consumers pay more attention to comfort and energy saving, and will choose models with low power configuration. In addition to the characteristics of the vehicle itself, consumers will also pay attention to after– sales service, maintenance and other issues to ensure worry– free use after buying a car [42, p. 25].

In terms of consumer acceptance, with the continuous development of the new energy vehicle market, consumers' acceptance of new energy vehicles has gradually increased. On the one hand, the positive role of new energy vehicles in solving urban travel and reducing air pollution has been recognized; With the continuous progress of technology and the reduction of cost, new energy vehicles are gradually approaching the level of traditional fuel vehicles in terms of performance, battery life and charging, further expanding the range of consumers' choices. In the future, with the sustainable development of the new energy vehicle market and consumers' in-depth understanding of the concepts of environmental protection and energy saving, new energy vehicles will be recognized and accepted by consumers in a wider range [13, p. 56].

Broad development space and market opportunities. The empirical results show that the carbon dioxide emission level of importing countries (regions) has a significant impact on the export of new energy vehicles in China. With the increasingly severe greenhouse effect and the threat of energy depletion, countries put the development of new energy vehicles on the agenda. At the same time, countries are increasingly subsidizing the new energy vehicle market. China should grasp the wave of strong global demand, and rely on the accumulated technical achievements and policy support to steadily enhance its export competitiveness. However, in this process, we should strengthen the export management and standardize the export order, so as to realize the sustained and healthy development of China's new energy vehicle exports. Specifically, first, improve the intensity of fiscal and taxation preferential policies. Policy banks and other relevant financial institutions provide sufficient funds to escort China's new energy automobile enterprises to carry out overseas business. At the same time, we will use national policies to provide more comprehensive

and reliable information services for enterprises going out to sea to help them go out to sea [47, p. 50]. Second, in order to support overseas R&D activities and technological innovation of new energy automobile enterprises, special overseas R&D funds and R&D subsidy mechanisms should be set up. By providing stable financial support, we can stimulate the enthusiasm of independent research and development of enterprises and promote the construction of independent brands. Third, strengthening export management is the key to improve the export quality of new energy vehicles and maintain the order of overseas markets. We should establish a strict export qualification examination system and set up a reasonable export threshold to ensure the quality and safety of export products. By standardizing the export order, the brand image and competitiveness of China new energy vehicles in overseas markets will be enhanced, and sustainable export growth will be realized [39, p. 39].

In order to better develop the new energy automobile industry, we must strengthen the training of professionals. This bag

Including manufacturing, overhaul and maintenance technologies, these technologies are brand new and different from traditional automobile manufacturing methods.

Therefore, the demand for talents is different. We must also pay attention to the market and strive to improve the application level of new energy vehicles. Now, the talents trained in the field of new energy vehicles should have the following professional qualities: First, they should master electronic professional technology skillfully. Nowadays, the world is in the information age, and a large number of brand– new high– end information technologies are applied in the field of new energy vehicles, which requires relevant people to have a certain knowledge reserve of electronic professional technology. Moreover, new energy

vehicles are closely related to batteries, and even have applications in the fields of power control and intelligence, so electronic information technology is a must for future employees. In order to work better, it is urgent to master electronic technology. Secondly, the precision of automobile products is very high, especially the new importance is reflected. With the update of related technologies, maintainers need to pay attention to and learn from the technical update. They not only need to have superb automobile maintenance skills, but also must obtain professional qualification certificates for new energy automobile maintenance and master various technologies of electrical systems. Because the maintenance of new energy vehicles is more complicated than the maintenance of traditional vehicles, maintenance personnel need to have higher professional quality. Therefore, a solid grasp of theoretical foundation and rich practical experience are indispensable. Finally, the "newness" of new energy vehicles is reflected in the power principle and design structure. Today's new energy vehicles are more integrated with new technologies, and the repair standards are also improved accordingly.

3.2 BYD and Tesla in the international market development strategy recommendations

The development of BYD in the international market needs to comprehensively consider brand awareness, cultural differences, technical level, after-sales service and global layout. Enhance brand awareness: BYD's brand awareness in the international market is relatively low, which is an important factor restricting its further expansion in the

international market. Therefore, BYD should strengthen brand promotion, and enhance the brand's global popularity through multi-channel and multi-platform advertising. Adapt to cultural differences and consumption habits: There are significant differences in culture and consumption habits in different countries and regions. BYD needs to deeply understand the cultural characteristics and consumption habits of the target market and make targeted market positioning and product adjustment. Improve technical level and innovation ability: Technical level is one of the core elements for BYD to compete in the international market. In order to enhance its competitiveness, BYD needs to continuously carry out technological innovation and upgrading [17, p. 42]. Improve the after-sales service system: High-quality after-sales service is an important means to enhance consumer satisfaction and loyalty. BYD needs to establish a perfect after-sales service system to improve service quality and efficiency. Strengthen global distribution and cooperation: BYD should continue to strengthen global distribution and cooperation, expand international market channels and improve the competitiveness of its brand in the global market. By implementing the above suggestions, BYD is expected to make greater breakthroughs and development in the international market [16, p. 38].

The development of Tesla in the international market needs to comprehensively consider product research and development, supply chain management, sales channel expansion, policy dynamic concern, brand building and marketing, and local innovation. Intensify product research and innovation: Tesla should accelerate the launch of new models covering the low-end market to fill the gap in the price range below 200,000 yuan, thus attracting more consumers. At the same time, the existing models are continuously upgraded and improved to meet the diversified and personalized needs of consumers. Tesla should

continue to strengthen the research and development and application of intelligent technologies such as FSD to enhance the added value and competitiveness of products. By continuously optimizing the algorithm and collecting more road data, the accuracy and safety of the automatic driving system are improved. Optimize supply chain management: Tesla should establish a long-term and stable cooperative relationship with suppliers to ensure the stable supply of raw materials and cost control. At the same time, actively seek new suppliers to reduce the risk of dependence on a single supplier. Improve procurement efficiency, improve the transparency and efficiency of procurement process and reduce procurement cost by adopting advanced procurement management system and technical means. Third, expand diversified sales channels: Tesla should actively seek partners in the international market, strengthen international cooperation and exchanges by establishing overseas factories and expanding sales channels, and enhance its global market share. In addition to the traditional 4S shop and dealer model, Tesla can also consider online sales, direct sales model and other sales channels to improve sales efficiency and flexibility. Pay attention to policy trends and respond to market changes: Tesla should pay close attention to the policy trends and market changes of new energy automobile industries in various countries and adjust its development strategy and business strategy in time. For example, in response to the EU's policy of reducing import tariffs on Chinese-made Tesla, Tesla can seize the opportunity to expand its share in the European market. Facing the competitive environment in different markets and changes in consumer demand, Tesla should adopt flexible market strategies. For example, in the China market, in response to the competitive pressure of local brands, Tesla can increase its market share by introducing models and configurations that better meet the needs of China consumers and optimizing after-sales

service. Focus on local innovation: Tesla's product strategies in different international markets should consider the needs and preferences of local consumers. For example, models launched in China market can pay more attention to interior luxury and intelligent configuration; In the European market, the environmental performance and driving experience of products can be emphasized.

By constantly optimizing and adjusting its own strategy and business strategy, Tesla is expected to maintain its leading position in the international market and achieve sustainable development.

Grasp export opportunities and improve export policies.

Countries attach importance to global warming and energy shortage, which provides a wider range for new energy automobile enterprises in China.

With the rapid growth of sales volume, the automobile output also shows explosive growth, which brings great challenges to after-sales maintenance, maintenance, parts replacement and other services. However, most of the current maintenance personnel are veterans who have been engaged in the traditional automobile industry for many years, and they cannot directly participate in the maintenance of new energy vehicles. New energy vehicles involve a wide range of technical fields from production to use, and more professional technology is needed for maintenance, which greatly increases the difficulty of maintenance. Nowadays, in the development of auto parts industry, more attention is paid to the cultivation of talents in the fields of product and process design and sales. At present, there is a serious shortage of talents in the field of new energy vehicles. In order to promote the sustainable development of new energy vehicles, we must strengthen training and improve the professional skills of maintenance personnel to meet the growing demand for

after-sales service. We should also carry out strategic cooperation with foreign automobile enterprises to jointly cultivate international maintenance talents, so that the talents in the automobile industry can not only be familiar with the domestic market, but also have a deep understanding of the international market, thus building a team with high professionalism [41, p. 137].

Differentiation strategy. In the future, the export of new energy vehicles in China needs to adopt differentiated strategies for different markets according to the analysis and division of the existing global markets. Asia, North America and Europe are the regions with the fastest development speed of new energy vehicles, so it is necessary to maintain the current development momentum and find opportunities to strengthen them. The proportion of exports to Africa and South America is still small, and it is necessary to fully understand local policies and actual conditions and tap the potential. Oceania market is the least exported market in China at present, so we should try our best to find a breakthrough in market expansion on the basis of maintaining the existing market. We should always pay attention to the local economic and social development, relevant policies promulgated by the government, infrastructure construction, etc. for those markets that have not yet entered, which can fully keep China fully aware of its market trends and gain the opportunity to occupy new markets when conditions are sufficient [55, p. 90].

According to the previous research results, the export of new energy vehicles should fully consider the culture, income level and consumption preference of each region, and formulate appropriate products, pricing and marketing strategies according to these differences. Only in this way can we better meet the needs of different regions and bring better experience to consumers.

After preliminary research, we found that at present, the main sales target countries of new energy vehicles in China are Asian countries, and their vehicle categories include pure electric vehicles and off-road vehicles. The most obvious advantage of these vehicles is that their prices are relatively low. Because the economic situation of Asian countries is relatively backward compared with other regions, their purchasing power is correspondingly stronger than that of other regions. China will continue to strive to improve the performance and quality of its products, so as to maintain the competitiveness of its Asian countries, and further develop its products to Africa, South America and Oceania, so as to expand its market. At present, EU's sales are among the highest in the world, including plug-in hybrid gasoline engines and off-road gasoline engines. The living standard of EU people has always been the best in the world, and they attach great importance to the reliability and practicability of new energy vehicles. In order to meet the needs of Europeans, China automobile manufacturers should actively explore the preferences of Europeans and develop and produce new energy vehicles according to their preferences. Only by changing the appearance and interior of cars can the vehicles of China automobile manufacturers gain wide recognition and advantages in Europe. There are many similarities in the market environment between North China and Europe. Therefore, in order to make's brand of new energy vehicles go global, its own R&D strength must be fully invested, so that it can better integrate into the global economic environment and have a unique international competitive advantage. In recent years, South America's economy has grown rapidly, and China's automobile products have also begun to spread to South America. It is particularly worth mentioning that China's automobile products are mainly concentrated in pure electric vehicles. In order to maintain the international influence in this field, we need to continue

our efforts and constantly explore new automobile products. The economic situation in Africa is not optimistic, and the lack of infrastructure is also a big challenge. Therefore, we should take targeted measures to meet the needs of Africa, and use the "Belt and Road" policy to strengthen exchanges with Africa and jointly open up a new sustainable transportation network.

3. 3 Government's support suggestions in policy, technology and market

In order to further improve the market share and international competitiveness in the future and realize the transformation of China from an "automobile power" to an "automobile power", this section puts forward relevant policy suggestions from two levels of government and enterprise industry:

Actively respond to trade barriers and promote mutual recognition of new energy vehicle certification.

The empirical results show that the influence of policies and opportunities is particularly obvious in the rapid growth of new energy vehicle exports in China.

Among them, the level of technical barriers to trade in importing countries (regions) will hinder the export quantity of new energy vehicles in China and raise the export price, on the other hand, it will help to improve the quality of new energy vehicles in China and diversify the export market. Therefore, under the background that trade protectionism is on the rise and some countries set up technical barriers to trade to hinder the export of new energy vehicles in China, the China government should actively meet the challenge and take a series of measures to promote the mutual recognition of new energy vehicles, improve

product quality and expand diversified markets, so as to enhance the global influence and competitiveness of China's new energy vehicle exports. Specifically, first, strengthen the early warning and prevention of trade barriers. The government should constantly improve the standard system of new energy vehicles, cover all aspects of production, manufacturing and sales, and strengthen the formulation and implementation of quality and technical standards. In particular, it is necessary to strengthen the supervision of the export trade of new energy vehicles, set a reasonable threshold for export access, and severely crack down on illegal activities such as shoddy, so as to ensure the quality level of exported new energy vehicles and thus enhance export competitiveness. Second, promote the international mutual recognition process of new energy vehicle certification. The government should actively seek cooperation with foreign authoritative certification bodies, promote mutual certification with European Union and other new energy vehicle standards, and pay close attention to the changes of foreign new energy vehicle technical regulations and trade policies, so as to provide more comprehensive and professional information support for China's new energy vehicle export. Third, seize the opportunity of the rapid development of the European new energy vehicle market. With the help of the "17+1" cooperation mechanism between China and Central and Eastern European countries, we will strengthen technical exchanges and cooperation with automobile manufacturing powers such as Europe, and constantly improve the product quality and technical level of new energy vehicles in China, so as to gain greater competitive advantage in the global new energy vehicle market.

Actively respond to trade barriers and promote mutual recognition of new energy vehicle certification

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China's new energy vehicle export. Third, seize the opportunity of the rapid development of the European new energy vehicle market. With the help of the "17+1" cooperation mechanism between China and Central and Eastern European countries, we will strengthen technical exchanges and cooperation with Europe and other automobile manufacturing powers, and constantly improve the product quality and technical level of China's new energy vehicles, so as to gain greater competitive advantages in the global new energy vehicle market [18, p. 160].

Strengthen economic and trade cooperation with other countries in the world and work together to promote the construction of hardware facilities.

The empirical results show that on the demand side, the population size of importing countries (regions) exports new energy vehicles to China.

The quantity margin and price margin have obvious promotion effect. On the supply side, the geographical distance between the two countries has a negative impact on the export of new energy vehicles in China. In terms of policies and opportunities, the economic freedom of importing countries (regions), as an external factor, has a significant positive impact on the expansion and competitiveness of China's new energy vehicles in the global market. It not only provides favorable external conditions for the new energy vehicle industry, but also promotes the continuous improvement of technology and products of China's new energy vehicles. The economic freedom of importing countries (regions) can significantly promote the expansion margin and price margin of China's new energy vehicle exports. Therefore, in the new era, China government should actively expand economic and trade cooperation with other countries, deepen the construction of free trade zones, actively seek potential trading partners, and strengthen the construction of hardware facilities with

distant countries. Specifically, first, actively promote the free trade arrangements with countries that have signed FTA to a higher level, and strive to explore other potential countries that can achieve mutual benefit and win– win. These countries often have large populations and strong demand. In short, strengthen economic and trade cooperation with other countries in the world and expand the export market of new energy vehicles in China. Second, encourage China new energy automobile enterprises to go out. Support local investment in factories, the establishment of overseas production bases and the establishment of industrial parks. Actively exchange and learn from advanced countries of new energy vehicles, help the transformation and upgrading of China's automobile industry, and realize the sustained and healthy development of China's automobile industry. Third, in the process of promoting economic exchanges and cooperation with trading partners, China should actively promote infrastructure construction with trading partners and build efficient international transportation channels. By optimizing the logistics network, the transportation cost can be reduced, the logistics efficiency can be improved, and then the potential trade barriers can be eliminated and the trade cost can be reduced [40, p. 51].

Expanding Infrastructure Layout China new energy automobile enterprises are actively expanding overseas markets, not only building their own charging infrastructure in the local government, but also taking various measures to strengthen investment in overseas markets, so as to gain more development opportunities.

Despite the technological progress of new energy vehicles and the improvement of charging infrastructure, the international market of these vehicles is still in the initial stage of development, mainly due to the different policy incentives in different countries. Due to the challenges related to local charging infrastructure and incomplete charging facilities, the

development of overseas markets of new energy vehicles in China has been hindered in some countries. China new energy automobile enterprises should take various measures to speed up the construction of overseas charging facilities, improve infrastructure, improve the charging and after-sales service of new energy vehicles, alleviate the worries of foreign consumers and stimulate their desire to buy, so as to expand overseas markets.

Tesla is the most influential manufacturer of new energy vehicles in the world. With its self-built charging network as the core, it has achieved a large-scale layout around the world and formulated strict charging facilities standards to provide consumers with more convenient travel services. China New Energy Automobile Company has not developed to a certain scale in overseas markets, so risks and economic costs must be considered when investing in local charging infrastructure. Therefore, the company must make long-term planning according to its overseas market size.

In 2017, BMW Group Company, Daimler Group Company, Ford Group Company and Porsche Co., Ltd. of Volkswagen Group Company jointly established the European Union Electric Vehicle Charging Network Operation Co., Ltd. IONITY, which marked the all-round development of the European Union electric vehicle charging industry. The participation of Hyundai Korea Co., Ltd. and Kia Motors Co., Ltd. provided strong support to meet the urgency of charging electric vehicles in the European Union. Close cooperation between automobile enterprises can greatly enhance their respective competitiveness, thus achieving a win-win situation, reducing the competitive pressure of China new energy automobile enterprises in the international market, which has also become one of the important means for China new energy automobile enterprises to enter the international market. At present, China new energy automobile enterprises have begun to adopt close

cooperation with local operators, energy companies and power systems to achieve a win-win situation. China's new energy vehicle enterprises are actively expanding the international market by using their advanced technologies in bus and taxi industries, and participating in international policy formulation, industry standard formulation and technological innovation, so as to provide more choices for international customers. At the same time, China's new energy vehicle enterprises are also trying to broaden the international market, enhance their international status, and use their international business philosophy to achieve better internationalization.

In order to further develop new energy vehicles in China, the China Municipal Government is trying to change the current technology and service mode so that it is no longer bound by supply chain, individual and public services. To this end, the government of China is taking various measures to improve the reliability of the international market, and constantly enhance the scope of charging services to further develop new energy vehicles in China.

Establish a perfect standard system. Many automobile manufacturers have formulated various technical specifications for the automobile industry around the world. Among them, Japan Electric Vehicle Association has formulated strict technical specifications for batteries, hybrid vehicles and other electric vehicles. In contrast, American Society of Automotive Engineers has formulated technical standards for hybrid, all-electric and fuel cell vehicles. In addition, some countries will reach a unified standard system through consultation. Many developed countries are working hard to establish stricter standards to ensure that their exported cars can occupy a dominant position in the global market. Therefore, China should also actively promote the industry standardization of new energy

vehicles, including complete vehicles, basic GM, key systems and components, facilities, etc., so as to ensure that R&D and production enterprises of new energy vehicles can produce products that meet the requirements according to industry norms. In addition, overcoming technical barriers to trade requires more advanced technologies, including in-depth analysis of the standard system of export markets, reference to existing international standards, mutual coordination, and timely adoption of relevant standards in line with international norms to improve the overall production capacity of China's new energy automobile industry. China automobile enterprises should also establish a consensus on charging standards with diversified foreign standard systems, and make necessary adjustments to their software and hardware according to the standards of exporting countries, so as to ensure compatibility and promote the export of new energy vehicles in China.

Conclusion

New energy vehicles are still in the early stage of development in the world, and will continue to accept multiple tests of products, technologies and markets. However, with the continuous development of technology and the continuous improvement of market maturity, new energy vehicles will play an increasingly important role in the international trade market.

Under the background of global energy shortage and environmental pollution, the environmental protection and energy substitution function of new energy vehicles will get more and more attention. At present, many countries in the world have put forward the timetable for the withdrawal of fuel vehicles from the market. It is an inevitable trend for new energy vehicles to replace traditional fuel vehicles, which also means that new energy vehicles will become the competition center of the international automobile market in the future. China has foresight to vigorously promote the development of new energy vehicles and international trade.

In order to further develop new energy vehicles in China, the China Municipal Government is trying to change the current technology and service mode so that it is no longer bound by supply chain, individual and public services. To this end, the government of China is taking various measures to improve the reliability of the international market, and constantly enhance the scope of charging services to further develop new energy vehicles in China.

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With the continuous development of global economy and society, the continuous introduction of relevant incentive policies by governments and the continuous improvement of power supply infrastructure, the demand market for new energy vehicles will continue to expand, and the export trade of new energy vehicles in China will also usher in a bigger market. In addition, with the continuous development of the global market of new energy vehicles and the continuous improvement of trade data of countries around the world, the research on the international trade of new energy vehicles can be more perfect and in– depth in the future.

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