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Field of study	38.04.01 Economics
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GRADUATION THESIS

on

Strategies for the Overseas Market Expansion of China's New Energy Vehicles

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ASSIGNMENT
FOR THE GRADUATION THESIS OF

Master's degree student Zhao Yongyong, group 24ЭЭвам1, full-time mode of study

The topic of the graduation thesis: "Strategies for the Overseas Market Expansion of China's New Energy Vehicles"

was approved by the university order
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1 The deadline for the Master's degree student to complete the graduation thesis is 15.06.2026.

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

3 The list of issues to be studied includes the development status, constraints, and optimization strategies of China's NEV overseas market expansion.

4 The list of visuals contains tables and figures.

5 The date of setting the assignment is 8.10.2024.

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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	1.09.2024 – 31.10.2024	
2	Framing the scientific concept of research	1.11.2024 – 18.12.2024	
3	Collection of scientific literature for the thesis	19.12.2024 – 15.01.2025	
4	Substantiating the relevance, concept, and novelty of the research	16.01.2025 – 19.02.2025	
5	Framing of a detailed plan and layout of the research	20.02.2025 – 12.03.2025	
6	Studying new literature sources within the topic of the thesis	13.03.2025 – 26.03.2025	
7	Conducting theoretical research within the first chapter of the thesis	27.03.2025 – 30.04.2025	
8	Preparing the first chapter of the thesis	1.05.2025 – 30.06.2025	
Second year of study			
9	Conducting analytical research within the second chapter of the thesis	1.09.2025 – 22.10.2025	
10	Preparing the second chapter of the thesis	23.10.2025 – 24.12.2025	
11	Conducting analytical research within the third chapter of the thesis	25.12.2025 – 25.02.2026	
12	Preparing the third chapter of the thesis	26.02.2026 – 21.04.2026	
13	Preparing the introduction and conclusion	22.04.2026 – 12.05.2026	
14	Completing the graduation thesis	13.05.2026 – 27.05.2026	
15	Handing in the thesis for compliance control and antiplagiat	28.05.2026 – 11.06.2026	
16	Getting acquainted with the feedback and review	13.06.2026	
17	Presenting the written thesis	15.06.2026	

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Summary

The graduation thesis comprises 65 pages, 3 chapters, 9 figures, 6 tables, 72 sources.

NEW ENERGY VEHICLES, CHINA, OVERSEAS MARKET EXPANSION, DIFFERENTIATED MARKET STRATEGY.

The objective of this study is to explore the key constraints faced by China’s new energy vehicle (NEV) industry in overseas market expansion, and to promote the high-quality globalization development of China’s NEVs by constructing a systematic strategic optimization framework.

The goal of this study is to analyze the demand characteristics and entry barriers of overseas markets for China’s NEVs, summarize enterprises’ experience and shortcomings, and propose countermeasures. It is particularly necessary to study the internationalization path of emerging economies represented by China in the NEV sector.

The methodological framework consists of theoretical and practical methods, including literature review, comparative analysis, case study, and inductive-deductive methods, supplemented by quantitative and descriptive research.

The research results include: reviewing China’s NEV industry evolution across four stages. Analyzing the «Europe-Southeast Asia» bipolar export structure (≈ 40 % and 28 % of total exports in 2023). Identifying three constraints external policy barriers (EU duties of 17.4 % - 38.1 %, US tariffs of 100 % - 125 %), weak enterprise adaptability (brand awareness < 30 % in Europe), and supply chain shortcomings, and proposing three optimization strategies international standard management, green supply chain construction, and differentiated market strategies with green brand communication.

It is recommended that government-level authorities accelerate participation in international standard-setting and establish carbon footprint mutual recognition mechanisms. That industry associations build overseas market information sharing platforms, and that enterprises deepen localized R&D and production layouts, construct green supply chain traceability systems, and develop diversified brand communication matrices, forming a new overseas expansion pattern with coordinated promotion among multiple stakeholders.

The theoretical relevance of this paper lies in constructing a three-dimensional constraint analysis framework of «external policy risks enterprise adaptability supply chain internationalization shortcomings», systematically integrating the relatively scattered

restrictive factors in previous studies, designing «green supply chain construction» and «international compliance capability enhancement» as independent strategic modules, and proposing the «green brand international communication path» as a core component of differentiated market strategies, providing a new theoretical perspective for the internationalization of Chinese NEV brands.

Future research may focus on the market entry strategies for NEVs in countries along the «Belt and Road» Initiative, the mechanisms of industrial technology cooperation in the NEV sector among developing countries, and the models of localized production and brand cultivation for Chinese NEV enterprises in late-mover markets.

Content

Introduction …… 3

Chapter 1 Analysis of the Development and Export Status of China's New Energy Vehicles Industry ……..……..…… 7

1.1 The Development History and Stage Characteristics of China's New Energy Vehicles …… 7

1.2 Spatial Distribution and Demand Structure Analysis of the Overseas Market…….……..…….. 10

1.3 Competitiveness of Export Products and Market Evaluation Performance. 16

Chapter 2 Constraints on the Expansion of China's New Energy Vehicles in Overseas Markets ……..……. 22

2.1 Constraints from External Policy Barriers and Geopolitical Risks …….. 22

2.2 Shortcomings in Supply Chain «Going Global» and International Operations…… 29

2.3 Shortcomings in Supply Chain «Going Global» and International Operations …….…… 35

Chapter 3 Optimization of Strategies for the Expansion of China's New Energy Vehicles in Overseas Markets …..……..…….. 40

3.1 International Standard Management Optimization of Technical Paths….. 40

3.2 Building Green Supply Chains and Enhancing International Compliance Capabilities …… 43

3.3 Differentiated Market Strategies and International Communication Paths for Green Brands …… 48

Conclusion ……. 53

References …….……. 56

Introduction

With the deepening of the global energy structure transformation and the advancement of the carbon neutrality goal, the new energy vehicle industry has become a key area of strategic competition among various countries. After going through policy nurturing, technological breakthroughs, and large– scale development, China's new energy vehicles have ranked first in global production and sales for consecutive years, and the export scale has shown explosive growth. According to the China Association of Automobile Manufacturers, in 2024, China's new energy vehicle export volume exceeded 2 million units, with a year– on– year growth of over 50 %. The export markets cover major regions such as Europe, Southeast Asia, the Middle East, and Latin America. This growth trend not only reshapes the global automotive industry competition landscape but also provides an important fulcrum for China's manufacturing to shift from «quantity expansion to quality leap». At the same time, the acceptance of Chinese new energy vehicles in overseas markets is continuously increasing, and consumers demand for intelligent and low– carbon products is continuously being released. However, behind the rapid expansion of export scale, Chinese new energy vehicle enterprises also face a series of challenges such as increasingly complex policy barriers, geopolitical risks, difficulties in local adaptation, and insufficient international operation capabilities of supply chains. How to systematically identify these constraints and build scientifically effective overseas expansion strategies has become a key issue determining whether Chinese new energy vehicles can achieve sustainable globalization.

Regarding the academic background of this research, existing studies have laid a multidimensional foundation. Early research primarily focused on the industrial development path of China's new energy vehicle industry, analyzing the driving effects of policies at different stages, such as the transition from direct subsidies to market– based mechanisms, as well as the synergy between policy support and the pursuit of technological novelty. Subsequently, scholars gradually turned their attention to export competitiveness, exploring how technological breakthroughs and cost advantages, especially in the battery industry chain, have become the core driving forces for the rapid

growth of export scale. In recent years, facing changes in the international trade environment, studies have begun to systematically examine the external policy barriers encountered by Chinese new energy vehicles in overseas markets, including anti– subsidy investigations, carbon tariffs, and technical regulations. At the same time, some studies have used typical enterprise cases as entry points, analyzing the practical challenges of market adaptation, brand building, and supply chain internationalization in the process of international expansion. On this basis, the academic community has further discussed the transformation of China's new energy vehicles from product export to brand and standard export, emphasizing the need for strategic breakthroughs at multiple levels. Drawing on the above research, this paper aims to construct a three– dimensional constraint analysis framework of external policy risks – enterprise adaptability– supply chain internationalization shortcomings' and to propose corresponding optimization strategies, thereby providing a more systematic diagnostic and practical path for the overseas expansion of China's new energy vehicles.

The research subject of this article is the overseas expansion behavior and strategic framework of China's new energy vehicle industry. Specifically, the research subjects include: Chinese new energy vehicle manufacturing enterprises and their export products. The spatial distribution, demand structure and competitive environment of overseas target markets. External policy barriers and geopolitical risks that affect overseas expansion. The current capabilities of enterprises in terms of technology adaptation, brand building, supply chain management and international compliance. As well as the current implemented or optimizable market entry and competition strategies.

The core research topic of this paper is: In the context of the continuous expansion of China's export scale of the new energy vehicle industry and the increasingly fierce international competition, how to identify and overcome the key constraints in the expansion of overseas markets, and then construct a systematic optimization strategy to enhance the competitiveness and sustainable development ability of China's new energy vehicles in the global market. The research follows the main line of «current situation analysis constraint identification strategy optimization», and explores the coordinated development paths in multiple dimensions such as technical standards, green supply

chains, and brand promotion, aiming to provide strategic references for Chinese new energy vehicle enterprises and policy makers.

The research objectives of this article cover three aspects: Firstly, systematically review the development history, stage characteristics, and export status of China's new energy vehicle industry, clarify the spatial distribution and demand structure of the overseas market, and assess the competitiveness of exported products. Secondly, deeply analyze the key constraints faced by China's new energy vehicles in expanding overseas markets, including external policy barriers and geopolitical risks, insufficient local adaptation capabilities of enterprises, and shortcomings in international supply chain operation. Thirdly, based on problem diagnosis, propose practical optimization strategies, including international standard management and technical path optimization, green supply chain construction and improvement of international compliance capabilities, differentiated market strategies and green brand communication paths.

The main research tasks of this paper are divided into four stages: The first stage involves data collection and preprocessing. Through various channels, research data such as the export volume, market share, policies and regulations, and enterprise cases of China's new energy vehicles are collected. The original data is screened and cleaned, and content with low relevance to the research topic is deleted. The accuracy and completeness of the data are strictly verified. The main research methods adopted in this paper include: literature review method: Systematically reviewing domestic and international academic literature to sort out existing research findings and identify research gaps; comparative analysis method: Comparing the policy environments, technical standards, and demand characteristics of different overseas markets, such as Europe and Southeast Asia; case study method: In– depth analysis of the overseas expansion practices of representative enterprises like BYD and NIO to summarize experiences and lessons; inductive and deductive methods: Based on the analysis of the current situation and constraints, synthesizing and proposing optimized strategy frameworks for overseas expansion.

The third stage, based on the previous research results, explains and demonstrates the internal logic of the constraints and the feasibility of strategy optimization, and clarifies the applicable conditions of different strategies in different target markets. The fourth stage

summarizes the implications of China's overseas expansion of new energy vehicles for industrial upgrading, adaptation to international trade rules, and brand internationalization construction, and forms systematic strategic recommendations.

The main novelties of this paper are reflected in three aspects: First, a three–dimensional constraint analysis framework of «external policy risks enterprise adaptability supply chain internationalization shortcomings» has been constructed, systematically integrating the relatively scattered restrictive factors in previous studies and enhancing the comprehensiveness and depth of problem diagnosis. Second, «green supply chain construction» and «international compliance capability improvement» have been designed as independent strategic modules, responding to the current real challenges of global carbon barriers, ESG investment standards, and changes in trade rules on the export of new energy vehicles, and having strong contemporary relevance and practical value. Third, «green brand international communication path» has been proposed as the core component of differentiated market strategies, transcending the traditional research's single focus on price and channels, emphasizing the enhancement of brand awareness and emotional identification through low– carbon certification, green narratives, and local communication, providing a new perspective for the internationalization of Chinese new energy vehicle brands.

In recent years, as carbon emission regulations become increasingly strict in various countries and consumers' environmental awareness continues to rise, China's new energy vehicles have seized opportunities in the overseas market while also revealing numerous deep– seated problems. There are significant differences in charging standards, safety certifications, and data privacy regulations across different markets. Companies often need to customize multiple technical solutions for different regions, significantly increasing research and development as well as compliance costs. Some countries, citing reasons such as «overcapacity» and «national security», have imposed tariffs or set non– tariff barriers on China's new energy vehicles, leading to a significant increase in geopolitical risks. Moreover, problems such as an incomplete overseas after sales service network, insufficient local supply chain support, and low brand recognition also constrain the transformation of China's new energy vehicles from «going out» to «going in». How to

balance rapid expansion and risk prevention, and achieve the simultaneous advancement of novelty– driven technologies, supply chain collaboration, and brand building, has become a major issue currently faced by China’s new energy vehicle overseas development.

The structure of this paper is organized as follows: Following this introduction, Chapter 1 analyzes the development history of China’s NEV industry, the spatial distribution and demand structure of overseas markets, and the competitiveness of export products. Chapter 2 identifies three key constraints on overseas expansion: external policy barriers and geopolitical risks, challenges in overseas market adaptation, and shortcomings in supply chain internationalization and operations. Chapter 3, building on the problem diagnosis, proposes optimization strategies from three dimensions: international standard management and technical path optimization, green supply chain construction and compliance capability enhancement, and differentiated market strategies along with green brand communication paths. Finally, the conclusion summarizes the research findings and offers prospects for future development. This article systematically analyzes the current situation, constraints, and optimization strategies of China’s expansion of the overseas market for new energy vehicles. By combining data and case studies, it explores the development opportunities and potential risks, and proposes targeted countermeasures and suggestions. The aim is to provide theoretical references and practical guidance for optimizing the policy environment, promoting international operations of enterprises, and enhancing the global competitiveness of the industry, thereby facilitating the high– quality global development of China's new energy vehicles under the new development pattern.

Chapter 1 Analysis of the Development and Export Status of China's New Energy Vehicles Industry

1.1 The Development History and Stage Characteristics of China's New Energy Vehicles

To comprehensively understand the strategic path for expanding the overseas market of China's new energy vehicles, it is necessary to first establish a rigorous analytical foundation regarding the domestic evolution process of this industry, its current global layout and its competitive positioning. This chapter systematically reviews the development trajectory of China's NEV industry, analyzes the spatial distribution and demand characteristics of overseas markets, and assesses the competitiveness and market performance of export products from multiple dimensions. Through an in– depth analysis of industrial policies, technological breakthroughs, regional market landscapes, and competitive advantages and disadvantages, this chapter aims to provide solid theoretical and empirical support for the internationalization strategies of Chinese NEV enterprises.

The development history of China's NEV industry reflects a dynamic process of policy– driven industrial transformation. Since the industry's inception, the government has introduced a series of targeted policies, each designed to address specific challenges and seize corresponding opportunities. This section analyzes four key policy stages using empirical data and case studies, revealing how China's NEV industry, under policy guidance and incentives, achieved rapid industrial expansion and technological upgrading. From the perspective of the industrial innovation system, the technological catch– up process of China's new energy vehicles demonstrates the synergy of policy– driven and market– driven forces. This dual– driven characteristic of «institutional advantages and market scale» has laid a solid foundation for subsequent internationalization [1, p. 36].

From a global perspective, the development of China's NEV industry shares similarities with the technological evolution of developed countries, while also presenting distinct Chinese characteristics. Unlike traditional automotive powers such as Europe, the United States, and Japan, which gradually transitioned to electric vehicles based on mature

internal combustion engine (ICE) industries, China's NEV industry achieved a technological leap by leveraging forward– looking strategic planning, continuous policy guidance, and large– scale resource investment. This development model is characterized by the deep integration of policy– driven innovation and technological advancement, as well as a strategic shift from domestic market cultivation to global market expansion.

First, the embryonic stage (early 21st century – 2008) was marked by strategic orientation and technological exploration. The «National 863 Program» for electric vehicles, initiated by the Ministry of Science and Technology in 2001, was a key catalyst. This program established a «three horizontals and three verticals» technical research system (i.e., batteries, motors, and electronic control as the «three horizontals»; hybrid, pure electric, and fuel cell vehicles as the «three verticals»), which provided direction for the industry's development over the following decades. The core task of this stage was technology verification and market cultivation. Due to low technological maturity and high manufacturing costs, government intervention was decisive. BYD's early investment in lithium iron phosphate (LFP) battery technology yielded significant results in 2008. Compared to nickel– cobalt– manganese (NCM) batteries, LFP battery costs were reduced by 40 % [9, p. 2].

The 2008 Beijing Olympics showcased NEV technology, with 500 new energy buses operating over 2 million kilometers and achieving an operational reliability rate of 98 %. However, market acceptance remained low. In 2008, the average price of an NEV was approximately 300,000 RMB, nearly double that of an equivalent ICE vehicle. The «New Energy Vehicle Production Access Management Rules», issued in 2007, set technical thresholds, and by 2008, only 12 out of 50 applying enterprises met the standards. The technological accumulation and policy experiments during this stage laid an important foundation for subsequent industrialization [9, p. 2].

Second, the industry development stage (2009 – 2015) was driven by policy– led market creation and supply chain formation. The «Ten Cities, Thousand Vehicles» project, launched in 2009, marked a turning point. This project provided central fiscal subsidies to public vehicle fleets in ten pilot cities, essentially creating initial market demand and motivating automakers to shift from R&D to production. By 2015, China surpassed the

United States to become the world's largest NEV market [8, p. 130]. Another notable feature of this stage was the initial formation of a localized supply chain, particularly in batteries. Companies like CATL (Contemporary Amperex Technology Co., Limited), BYD, and Guoxuan Gaoke grew rapidly. The introduction of consumer– end subsidies in 2013 expanded the market from public sectors to private buyers, marking the transition from «demonstration operation» to «mass consumption». However, rapid expansion also brought challenges, including uneven product quality and subsidy fraud incidents. In response, the government adjusted subsidy policies and introduced stricter review mechanisms, promoting a shift from «quantity expansion» to «quality improvement». By 2015, China had become the world's largest NEV market, confirming the effectiveness of the policy– driven model. The system analysis at this stage indicates that policy support has laid the crucial market foundation for the industry, while subsequent policy adjustments have driven the industry to shift from «quantity» expansion to «quality» improvement [20, p. 2].

Third, the structural adjustment and technological upgrade phase (2016 – 2020) saw a policy rebalancing from quantity growth to quality development. The subsidy fraud incident in 2016 prompted stronger government supervision. The introduction of the «Dual Credit Policy» (parallel management of average fuel consumption and NEV credits) in 2017 marked a fundamental transformation in the policy paradigm, replacing direct purchase subsidies with a market– based mechanism [20, p. 3]. This policy accelerated industry consolidation and forced less competitive players to exit. At the technical level, Chinese battery manufacturers such as CATL and BYD achieved global leadership in LFP battery technology, which offers advantages in safety, cost, and increasing energy density. Through continuous R&D, CATL increased battery energy density from below 200Wh/kg to over 300Wh/kg. BYD's blade battery technology significantly improved volumetric energy density through innovative structural design. This period also witnessed the rise of local NEV startups – NIO, XPeng, and Li Auto – which achieved differentiation through autonomous driving functions, intelligent cabins, and direct sales models. This phase concluded with the gradual withdrawal of central government vehicle purchase subsidies by the end of 2020, indicating that the industry had achieved a certain level of

market maturity and cost competitiveness. From 2016 to 2020, NEV market penetration increased from less than 2 % to over 5 %, and market growth remained robust even as subsidies declined [21, p. 40].

Fourth, the globalization and high– quality development stage (2021 – present) is characterized by strategic expansion and brand building. Leveraging a mature domestic market, resilient supply chains, and internationally competitive products, Chinese NEV manufacturers have initiated large– scale overseas expansion. Export volume increased from approximately 70,000 units in 2020 to over 1.2 million units in 2023, making China the world's largest automobile exporter [9, p. 3]. This stage involves not only export volume but also a comprehensive internationalization strategy, including overseas production bases, R&D centers, and localized brand building. For example, BYD launched three models (Han, Tang, and Yuan PLUS) in the European market in 2022, with pricing comparable to luxury brands. NIO established its first overseas service center in Norway, adopting a direct operation model. However, this stage is also characterized by increasing geopolitical and trade complexities. In 2023, the European Commission announced an anti– subsidy investigation into Chinese electric vehicles. In response, BYD announced plans to build its first European passenger vehicle factory in Hungary, and Changan Auto signed an agreement with the Thai government to establish a production base in Thailand. The core challenge of this stage is balancing active global expansion with strategic adaptation to a fragmented international regulatory environment [23, p. 56].

1.2 Spatial Distribution and Demand Structure Analysis of the Overseas Market

According to data from the General Administration of Customs of China, the spatial distribution of China's NEV exports is highly concentrated in two main regions: Europe and Southeast Asia. In 2023, Europe accounted for approximately 40 % of China's total NEV exports, while Southeast Asia accounted for about 28 %, together representing nearly 70 % of total exports. This bipolar structure reflects both the strategic choices of Chinese manufacturers and differences in market access conditions across regions (figure 1).

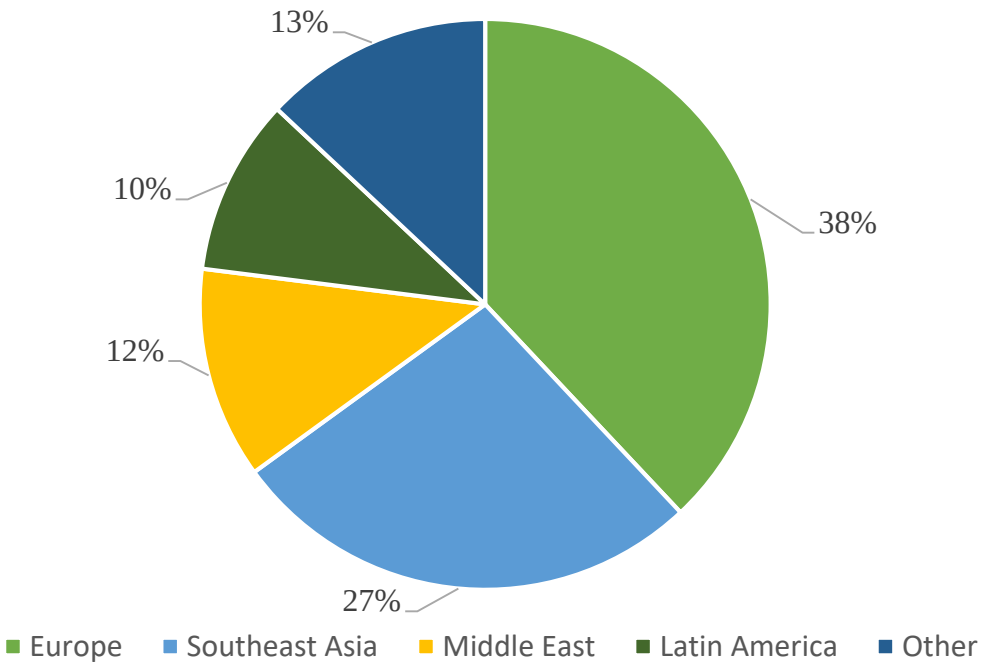

Figure 1 – Distribution of China's NEV Exports by Region in 2023 [38, p. 141]

European Market: Coexistence of Technical Barriers and Brand Premiums. Europe has become the most important export destination for Chinese electric vehicles (EVs) due to its strict environmental regulations, mature consumer market, and ambitious decarbonization goals. The EU's «Fit for 55» package and the effective ban on new ICE vehicles by 2035 have created structural demand for EVs, while the supply capacity of traditional European manufacturers is insufficient to meet this demand (European Automobile Manufacturers' Association, 2023). According to the European Automobile Manufacturers' Association, the EU's EV market penetration rate exceeded 22 % in 2023, but there is a structural supply gap, particularly in the mid– to– low– end market. Norway, Germany, the Netherlands, and the UK account for the majority of China's EV exports to Europe. However, the European market is not homogeneous. Western Europe has high technical barriers, requiring compliance with strict regulations such as the EU's General Data Protection Regulation (GDPR) and stringent vehicle type certification standards. Demand strongly favors high– end, technologically advanced vehicles, with consumers valuing safety ratings (e.g., Euro NCAP), brand heritage, and comprehensive after– sales service [4, p. 12]. From the perspective of international trade, the low– carbon policies in

the European market have provided structural opportunities for Chinese enterprises, but at the same time, they have set relatively high compliance thresholds, which require enterprises to make adequate institutional adaptation preparations before entering this market [28, p. 549].

However, the European market is not homogeneous. It presents distinct segmentation characteristics. The Western European market has high technical barriers, requiring enterprises to comply with strict regulations such as the EU's General Data Protection Regulation and stringent vehicle type certification standards. The market demand in this region strongly favors high– end, technologically advanced vehicles, with consumers highly valuing safety ratings, brand heritage, and comprehensive after– sales service systems. The ratings of the European New Car Safety Assessment Association are important reference indicators for consumers when purchasing vehicles, and models with a five– star rating are more likely to gain market recognition. This forces Chinese brands such as BYD, NIO, and Xpeng to focus on their high– end models in Europe, using this market as a testing ground to verify brand reputation and technical strength. In 2023, BYD mainly promoted its Han and Tang models in the European market, with prices exceeding 50,000 euros each, competing directly with brands like Audi and BMW. NIO provides battery swapping services in its user center in Germany, applying domestic accumulated operational experience to the European market, aiming to win consumers' favor through differentiated service experiences. Research based on the «dual circulation» new development pattern indicates that the preferences of consumers in mature markets have raised higher requirements for enterprises' ability to define products. Simply replicating domestic success stories is insufficient to meet the diverse needs of overseas users [45, p. 22– 25].

Southeast Asian Market: Geographical Advantage and Strategic Layout. Southeast Asia constitutes the second pole of China's EV exports, but its market dynamics differ significantly from Europe. Countries such as Thailand, Indonesia, and Malaysia have actively positioned themselves as regional EV manufacturing centers, offering preferential investment policies, tariff reductions, and tax incentives. Thailand's «30 @ 30» policy (aiming for 30 % of its vehicle production to be EVs by 2030) makes it an attractive

destination for Chinese enterprises to invest and set up factories. Through a big– data– driven demand analysis, this study found that the widespread adoption of NEVs in this region is largely influenced by government– led initiatives [7, p. 969], such as the electrification of public transportation fleets and government procurement projects (Tan et al., 2020). Southeast Asian consumers are highly price– sensitive, and demand is concentrated in the mid– range passenger car segment and commercial EVs (e.g., buses, taxis, and tricycles). Chinese manufacturers have effectively filled this market gap by leveraging cost advantages and mature supply chains [14, p. 32]. For example, in 2023, BYD's ATTO 3 (Yuan PLUS) became the best– selling EV in Thailand, with cumulative sales exceeding 15,000 units. The success is attributed to precise product positioning: the SUV model caters to local preferences, offers high value for money, and benefits from BYD's reliability in battery technology. Additionally, Chinese NEVs face relatively less competition from traditional Japanese and European automakers in Southeast Asia, as these companies have been slower to launch affordable electric models, allowing Chinese brands to gain a first– mover advantage in the mass market [10, p. 549]. Research conducted on the Southeast Asian market indicates that the region's price sensitivity necessitates enterprises to adopt a refined cost control strategy, and at the same time, through local production, reduce logistics and tariff costs, in order to effectively consolidate market share.

In addition to the two core markets of Europe and Southeast Asia, emerging markets such as the Middle East, Latin America, and Africa are also rapidly growing and have become the «third pole» of China's new energy vehicle exports. In 2024, China's new energy vehicle exports to the Middle East increased by approximately 45 % year– on– year. The United Arab Emirates and Saudi Arabia were the main growth engines. These markets present three distinct characteristics: Firstly, the government's strong will for green transformation both the «2050 Energy Strategy» of the United Arab Emirates and the «2030 Vision» of Saudi Arabia have listed electric transportation as a key development direction. Secondly, local consumers have a clear preference for SUVs and high– performance models, which are highly compatible with the product matrix of Chinese brands. Thirdly, the hot desert climate poses special technical requirements for battery

thermal management systems, and the accumulation of Chinese enterprises in temperature control technology has formed a differentiated competitive advantage.

The Latin American market presents a different demand structure. Represented by Brazil and Mexico, the penetration rate of new energy vehicles in this region is still at an early stage (less than 5 % in 2024), but the growth potential is huge. The Brazilian government resumed the tariff policy for imported electric vehicles in 2024 and plans to raise the tariff to 35 % in 2026, while requiring a 40 % local content rate. This policy orientation is driving Chinese automakers to transform from «vehicle export» to «local production». Great Wall Motors and BYD have both announced the construction of production bases in Brazil, and are expected to start production successively after 2025. Mexico, leveraging the geographical advantages of the USMCA (United States– Mexico– Canada Agreement), serves as a «stepping stone» for Chinese automakers to enter the North American market. However, vigilance is needed against the strict review of the US origin rules.

Beyond spatial concentration, the demand structure for China's NEV exports exhibits significant heterogeneity, particularly in terms of consumer preferences, price sensitivity, and the policy environment (table 1).

Table 2 – Comparison of Key Overseas Market Demand Characteristics [2, p. 77]

Dimension	European market	Southeast Asian market	Middle East / Latin America market
Core requirement	Technology leading, safe and reliable	Cost– effectiveness, durability	Government procurement, infrastructure support
Price sensitivity	Medium– high	High	High
Brand preference	Emphasis on traditional brands	In the process of forming brand loyalty	Price– oriented

In mature markets such as Europe, demand is shaped by both established consumer preferences and strict regulatory frameworks. The demand structure can be described as «technology and service sensitive». European consumers and regulatory authorities not

only demand product quality but also require transparency in data processing, robust cybersecurity measures, and comprehensive service support throughout the lifecycle. This requires Chinese enterprises to go beyond the simple export model and establish local infrastructure, including service centers, spare parts warehouses, and even battery recycling facilities. The case of BYD demonstrates that the company in Europe adopted a strategy of building an integrated ecosystem [5, p. 40]. integrating sales, services, and charging networks to meet these complex demands. Additionally, brand recognition remains a key factor influencing demand; Chinese new energy vehicles often face doubts about brand reliability, so they need to continuously invest in marketing, safety testing (such as the European New Car Assessment Program rating), and consumer education to overcome the disadvantages of brand history and win market recognition, and cultivate brand recognition. NIO launched the «leasing subscription» model in Germany, where consumers can pay monthly fees to use the vehicle without having to pay a high upfront purchase cost. This flexible business model lowers the threshold for consumers to try out new products and helps build brand recognition [19, p. 88].

In contrast, emerging markets such as Southeast Asia, the Middle East, Latin America, and Africa present a «cost and infrastructure sensitive» demand structure. Through big data analysis, it has been found that in these regions, the demand for new energy vehicles is often triggered by the availability of supporting infrastructure, such as the construction of government subsidies for charging stations and the electrification of public fleets. Price affordability is the primary consideration, and consumers and fleet operators prioritize the total life cycle cost rather than advanced features. This aligns well with the cost competitiveness of Chinese new energy vehicle supply, and Chinese enterprises, leveraging their scale advantages and integrated supply chains, offer lower purchase prices and maintenance costs, forming significant competitiveness in this region. Taking the Thai market as an example, the average selling price of Chinese brand electric vehicles in 2023 was approximately 1 million Thai baht (about 200,000 RMB), while the prices of similar Japanese brand electric vehicles were generally above 1.5 million Thai baht. The cost advantage of Chinese brands is very obvious.

In these markets, Chinese new energy vehicles often serve as the main solution for

the electrification of public transportation, such as electric buses and two– wheelers. In these application scenarios, durability and service convenience are more important than brand reputation. Government policies play an extraordinary role in shaping demand. The import tariff structure, localization rate requirements, and bilateral trade agreements directly affect market attractiveness. Just as the success of Chinese enterprises in the Thai market is partly attributed to the country's government's «EV 3.5» package policy, which encourages local production while also providing subsidies for imported electric vehicles, this aligns with the strategy of Chinese companies seeking to establish regional production centers. The Thai government offers subsidies for electric vehicles up to 150,000 Thai baht (approximately 30,000 RMB), and also lowers import tariffs. These policy measures significantly enhance the market competitiveness of electric vehicles. The Indonesian government, on the other hand, places greater emphasis on local production, requiring electric vehicle enterprises to gradually increase the localization rate to promote the development of the domestic industrial chain. In response to different policy environments, Chinese enterprises need to formulate differentiated entry strategies: in markets with strong policy incentives, they can quickly capture the market by exporting complete vehicles; in markets that place greater emphasis on local production, they need to consider establishing local production bases or forming joint ventures with local enterprises.

1.3 Competitiveness of Export Products and Market Evaluation Performance

The global competitiveness of China's NEVs is a multi– dimensional concept, encompassing product attributes, industrial ecosystem advantages, technological leadership, and market performance indicators. A comprehensive assessment reveals a complex picture: cost and technological advantages coexist with challenges in brand value and after– sales services. The systematic analysis of the factors influencing exports indicates that competitiveness is a multi– dimensional construct that requires a comprehensive assessment from both the technological and cost perspectives [7, p. 6– 8].

Technological Competitiveness: After two decades of accumulation, China has

formed significant advantages in batteries, motors, and electronic control systems. In 2023, CATL’s battery installation capacity reached 167.1 GWh (36.8 % global market share), ranking first globally for the seventh consecutive year. BYD's battery installation capacity reached 72.6 GWh (16.0 % global market share), ranking second. In the field of intelligent connectivity, Chinese brands also perform well, with autonomous driving assistance systems, intelligent cabins, and OTA upgrades becoming standard features. The core of China’s competitiveness has shifted from a simple cost advantage to a technology– cost composite advantage. Empirical analysis shows that the enhancement of technical capabilities has become the core driving force for export growth. China’s cost advantage in the battery sector has transformed into significant export competitiveness [16, p. 30].

Cost Competitiveness: This remains the cornerstone of China’s NEV export advantage, rooted in large– scale production and mature local supply chains. In 2023, China’s NEV production reached 9.587 million units, accounting for over 60 % of global production. The price of LFP batteries dropped below 0.5 yuan per watt– hour in 2023, a decrease of over 80 % compared to 2010, significantly reducing NEV costs. BYD’s large– scale production gives it a cost advantage, with its LFP battery costs being more than 20 % lower than competitors.

Supply Chain Resilience: In the post– pandemic era, supply chain resilience has become a key competitive dimension. China’s NEV industry has a high degree of vertical integration and geographical concentration. During the global chip shortage in 2021, Chinese NEV enterprises suffered less impact than international competitors due to localized supply chain advantages. The supply chain localization rate of Tesla’s Shanghai Gigafactory reached 95 %, demonstrating the maturity of China’s NEV supply chain. Quantitative analysis indicates that supply chain integrity is one of the core advantages of China’s new energy vehicles. However, it is necessary to be vigilant about the external dependence risks in key links, especially in areas such as automotive– grade chips and high– end IGBTs [46, p. 88].

Quantity Performance: Data since 2021 shows a sharp increase in NEV exports. As shown in Figure 1.3 (based on data from the General Administration of Customs of China, 2024), export volume grew from approximately 70,000 units in 2020 to over 1.2 million

units in 2023. Figure 1.4 shows that the cumulative year– on– year growth rate of pure electric passenger vehicle exports reached 296.8 % in 2021, 131.9 % in 2022, 73.1 % in 2023, 35.2 % in 2024, and 62.8 % in 2025 (preliminary). This indicates a gradual transition from explosive growth to stable growth. (figure 2).

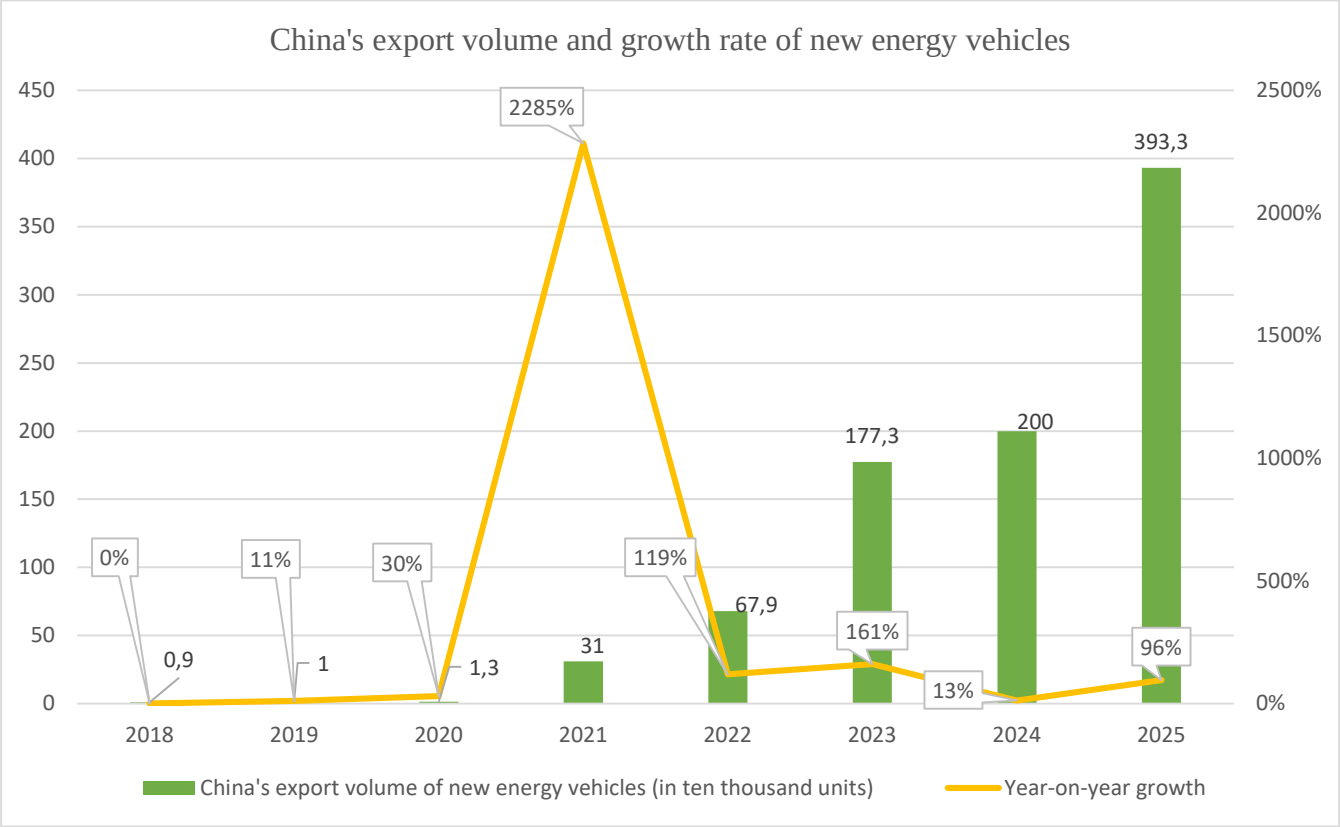

Figure 2 — Export Volume and Growth Rate of NEVs in China from 2018 to 2025 [48, p, 125]

The data in the chart shows a rapid increase in sales. The year 2021 marked the turning point for the export boom. The data for 2024 shows that the export volume exceeded 2 million vehicles for the first time. Calculated at 2.0 million vehicles, the export volume in 2025 is based on the total customs data of 3.933 million vehicles. In 2025, the export volume accounted for 47.3 % of the total automotive exports, reflecting the explosive growth in market demand.

Additional data: Cumulative year– on– year growth rate of export of pure electric passenger vehicles from 2018 to 2025. According to customs data, the cumulative year– on– year growth rate of export of pure electric passenger vehicles has changed as follows.

The cumulative year– on– year growth rate of export of pure electric passenger vehicles reached 296.8 % in 2021, 131.9 % in 2022, 73.1 % in 2023, 35.2 % in 2024, and 62.8 % in 2025. From this figure 3, it can be seen that the export of new energy vehicles has undergone a transformation from explosive growth to stable growth(figure 3).

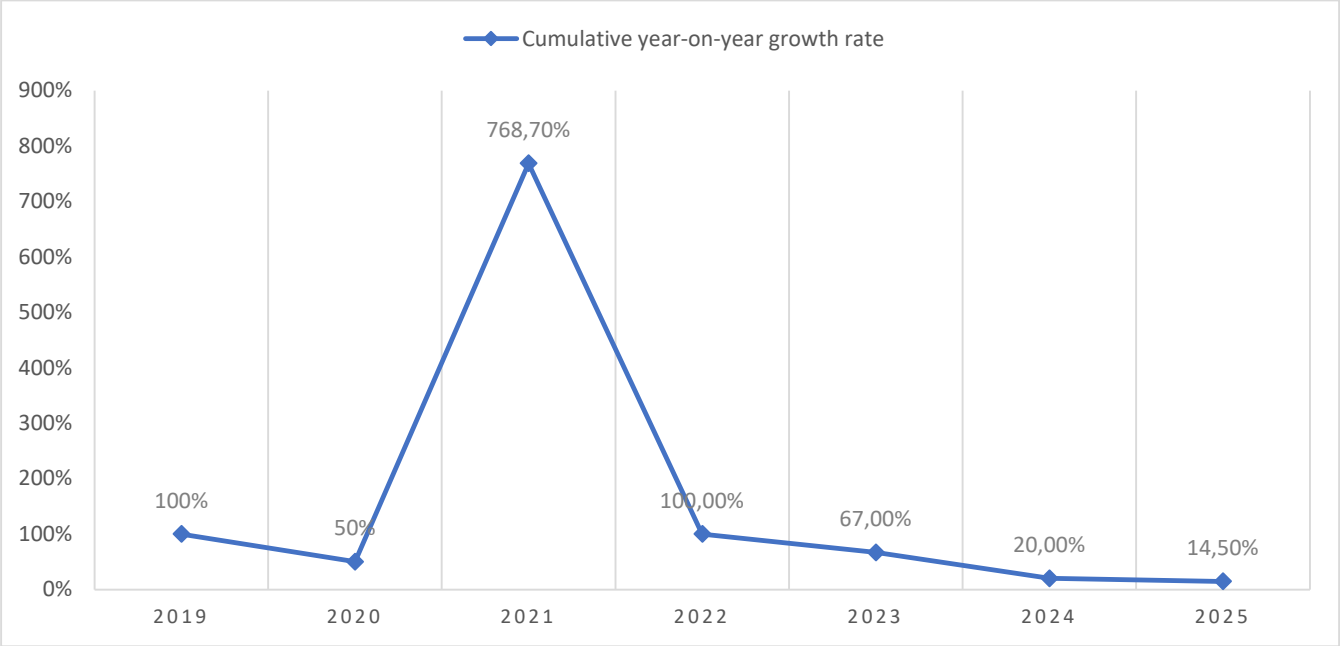

Figure 3 - Cumulative Year– on– Year Growth Rate of Pure Electric Passenger Vehicle Exports from 2018 to 2025 [52, p. 10]

The growth in the export sales of new energy vehicles is attributed to the cumulative effect of several factors: technological maturity, cost competitiveness, and strategic expansion into markets with strong demand such as Europe. At the same time, the continuous upward trajectory of export growth indicates the persistence of international market demand. This quantitative performance validates the competitive advantages of Chinese new energy vehicles in terms of product quality and cost, especially in the passenger car and commercial vehicle sectors. It is worth noting that the growth in China's new energy vehicle exports is not just an expansion in quantity. The optimization of the export structure is also worthy of attention. In 2023, the proportion of pure electric passenger cars in new energy vehicle exports exceeded 80 %, indicating that China's advantages in pure electric technology routes are being transformed into export

competitiveness. At the same time, the proportion of exports to the European market continued to increase, reflecting that Chinese new energy vehicles are entering mature markets with high barriers, and their product competitiveness has been recognized by the international market.

Quality Performance: The international reputation of Chinese NEV brands is steadily increasing. A case study of BYD shows that the enterprise's brand awareness in overseas markets increased from less than 20 % in 2020 to over 60 % in 2024. However, in terms of brand value, pricing ability, and profit margins, significant gaps remain compared to leading enterprises from Germany, Japan, and the United States. In the high– end market, Chinese brands still need to earn consumer trust through continuous product quality and user experience. For example, NIO’s flagship sedan ET7, launched in Norway at approximately 500,000 RMB, competes with BMW i5 and Mercedes– Benz EQE, demonstrating brand ambition but also the challenge of building premium perception. The analysis of the current situation and development prospects of exports in the new era indicates that brand building will be the core task in the next stage. Relying solely on price advantages is insufficient to sustain international competitiveness. Enterprises must simultaneously focus on product quality, user experience, and brand narrative [61, p. 89–94].

Service Network and After– Sales Support: A recurring weakness in market performance is the insufficiency of after– sales service networks and spare parts supply in overseas markets. This has led to customer dissatisfaction, rising maintenance costs, and damage to brand reputation. For instance, in the Norwegian market, the number of after–sales service centers for Chinese brand EVs is significantly lower than for traditional luxury brands. Some car owners need to travel long distances for maintenance.

The market performance assessment highlights the growing impact of external trade barriers. In October 2023, the European Commission initiated an anti– subsidy investigation into Chinese electric vehicles. In 2024, the EU announced plans to impose tariffs of up to 38.1 % on Chinese imported EVs, while the United States raised tariffs on Chinese EVs from 25 % to 100 %. These trade barriers are prompting Chinese enterprises to strategically shift toward local production and joint ventures. Therefore, the future

development of China's NEV exports will increasingly depend on the industry's ability to navigate geopolitical complexities, establish local value chains, and build brand value through product quality, service excellence, and sustainability credentials. The competitive landscape is shifting from product competitiveness to ecosystem competitiveness, requiring Chinese NEV manufacturers to develop capabilities in cross– cultural management, regulatory compliance, and global brand management. From the perspective of industrial evolution, the international competition of China’s new energy vehicles is upgrading from the product level to the ecosystem level. Enterprises need to make concerted efforts in three dimensions technology, standards, and brand – in order to gain an advantageous position in the global competition [48, p. 123– 139].

The future development trajectory of China’s export of new energy vehicles will increasingly depend on its ability to handle these geopolitical complexities, its ability to establish a local value chain, and its ability to build brand value through continuous stable product quality, excellent service levels, and sustainability credentials. Therefore, the competitive landscape is shifting from being primarily defined by product competitiveness to being defined by ecosystem competitiveness, which requires Chinese new energy vehicle manufacturers to develop capabilities in cross– cultural management, compliance regulation, and global brand management. Specifically, the key directions for future development include: First, deepen the localization strategy by establishing overseas production bases, R&D centers, and service networks to enhance responsiveness to local markets while avoiding trade barriers. Second, strengthen brand building through continuous quality improvement, user experience optimization, and brand promotion, gradually enhancing brand value and premium capabilities. Third, enhance compliance capabilities by studying international trade rules and national laws and regulations, establishing a complete compliance system, and reducing business risks. Fourth, promote technological innovation by continuously investing in key areas such as battery technology, intelligent connectivity, and lightweight materials to maintain technological leadership advantages. Fifth, strengthen international cooperation by means of technology licensing, strategic alliances, joint ventures, and other methods, to jointly develop with global industry partners and form a mutually beneficial and win– win industrial ecosystem.

Chapter 2 Constraints on the Expansion of China's New Energy Vehicles in Overseas Markets

2.1 Constraints from External Policy Barriers and Geopolitical Risks

With the rapid development of China's new energy vehicle (NEV) industry, the pace of international expansion has accelerated, and export volume has maintained high growth for several years. According to the China Association of Automobile Manufacturers (CAAM), in 2023, China's NEV export volume reached 1.203 million units, a year– on– year increase of 77.6 %. In the first half of 2024, export volume reached 785,000 units, and it was projected to exceed 1.6 million units for the full year. This growth enabled China to surpass Germany and Japan as the world's largest automobile exporter, with NEVs accounting for nearly 40 % of total exports in 2024, up from less than 10 % in 2020. However, during overseas market expansion, Chinese NEV enterprises are facing multiple constraints related to the external environment, internal operations, and industrial chain layout. The complex international policy environment, difficulties in local market adaptation, and weaknesses in global supply chain operations have become core obstacles restricting further expansion. These constraints are primarily manifested in rising import tariffs and non– tariff barriers, intensifying geopolitical risks, and divergent technical regulations and standards. The following analysis examines these three levels, supported by specific cases.

In recent years, developed markets such as Europe have significantly tightened trade restrictions on Chinese NEVs. In October 2023, the European Commission initiated an anti– subsidy investigation into Chinese– produced electric vehicles (EVs) – the first such deep investigation by the EU under the Foreign Subsidies Regulation (FSR) against a Chinese industry. In July 2024, the European Commission issued a preliminary ruling imposing temporary anti– subsidy duties on EVs imported from China [22, p. 15]. ranging from 17.4 % to 38.1 %. Combined with the existing 10 % basic tariff, the total duty for some models reached as high as 48.1 %. Specifically, BYD faced a 17.4 % anti– subsidy duty, Geely 20 %, and SAIC Group 38.1 %, the latter due to being deemed insufficiently

cooperative. The average rate for other cooperating firms was 21 %, while non– cooperating firms faced the maximum 38.1 % rate. This policy directly increased terminal selling prices of Chinese brand EVs in the EU by approximately 15 % – 20 %, significantly weakening their price competitiveness against European local brands (e.g., Volkswagen ID series, Renault Megane E– Tech). According to the European Automobile Manufacturers' Association (ACEA), the year– on– year growth rate of new registrations of Chinese brand EVs in the EU dropped from 78 % in 2023 to 12 % in the first half of 2024, with negative growth recorded in July 2024 – the first such decline since 2021. Consequently, some Chinese automakers adjusted their annual sales targets for the European market: SAIC Group reduced its target from 1.5 million to 1 million units, and NIO postponed its listing plans in several European countries. The economic impact assessment of imposing tariffs on Europe, America and Canada shows that this measure temporarily restricted the market expansion of Chinese products. However, in the long term, it will force Chinese automakers to accelerate the reconfiguration of their global supply chains and technological upgrades, forming a «pressure– driven transformation» mechanism [39, p. 68].

Restrictions in the US market are even more stringent. According to the final details of the Inflation Reduction Act (IRA), effective January 1, 2024, any EV containing battery components or key minerals produced by a «Foreign Entity of Concern» (FEOC) is ineligible for the maximum $7,500 consumer tax credit [21, p. 30]. China is explicitly listed as an FEOC, meaning that all EVs assembled in China or using Chinese– made batteries are excluded from these subsidies. The definition of FEOC not only covers enterprises within China but also includes overseas entities controlled or 25 % or more owned by the Chinese government, placing overseas battery factories of Chinese enterprises at risk of exclusion. Additionally, the US Trade Representative's Office (USTR) announced in May 2024 that import tariffs on Chinese EVs would increase from 25 % to 100 %, and tariffs on lithium– ion batteries would increase from 7.5 % to 25 %. This series of measures has effectively closed the channel for Chinese NEV passenger vehicles to enter the US market. According to US Customs and Border Protection (CBP), exports of Chinese NEVs to the US in the first half of 2024 were less than 2,000 units, a

year– on– year decrease of 92 %, with market share approaching zero.

BYD, as a leading Chinese NEV enterprise, saw its Atto3 (Yuan PLUS) and Seal models initially highly anticipated in the European market. In 2023, BYD's European sales reached 15,000 units, an increase of over 300 % year– on– year, with Atto3 ranking among the top ten EV models in Germany. However, following the imposition of countervailing duties, the recommended retail price of Atto3 in Germany increased from €38,000 to €42,000, causing it to lose its price advantage compared to the Volkswagen ID.4 (approximately €40,000). According to the German Automotive Research Center (CAR), following the price increase, Atto3's price competitiveness index in Germany dropped from 0.92 to 0.78 (with 1 as the benchmark), and annual sales are expected to decrease by approximately 6,000 units. To mitigate tariff impacts, BYD announced plans to build its first European passenger vehicle factory in Szeged, Hungary, with a total investment of approximately €5 billion, with production scheduled to begin in 2026 and an annual capacity of 150,000 units. This factory will primarily produce models such as Dolphin and Seal for the European market and plans to achieve local battery pack assembly to comply with EU battery carbon footprint regulations. However, the construction period is two years, during which BYD will still rely on vehicle exports and face profit compression due to high tariffs. Moreover, the Hungarian factory must pass strict EU environmental and labor standards reviews. In August 2024, a Hungarian environmental organization filed a lawsuit, arguing that the factory location is near a nature reserve, demanding a re– evaluation of the environmental impact assessment, which delayed construction progress by approximately three months.

In addition to Europe and the US, emerging markets have followed suit. Turkey announced in June 2024 that it would impose an additional 40 % tariff on Chinese EVs and require importers to have an annual production capacity of no less than 50,000 units in Turkey to qualify for preferential tax rates. Brazil resumed tariffs on imported EVs in January 2024 and plans to gradually increase the tariff to 35 % by 2026, while requiring automakers to gradually increase their local production ratio (see Table 2.1). These policies are making the business model that relies solely on vehicle exports unsustainable [31, p. 2].

Table 2 – Tariffs and Non– Tariff Barriers for China's NEVs in Major Markets [31, p. 2]

Market	Overall tax rate	Core restrictive measures	Effective Date
European Union	Maximum 48.1 %	Anti– subsidy duties (17.4 %– 38.1 %) Carbon footprint reporting requirements	July 2024
The United States	Maximum 125 %	Exclusion of IRA subsidies + 25 % battery tariffs + North American assembly requirements	May 2024
Türkiye	Maximum 90 %	40 % additional tax + Annual local production ≥ 50,000 vehicles	June 2024
Brazil	35 %	Phase– by– phase increase in tariffs + 40 % local content requirement by 2026	Starting from January 2024
India	70 % – 100 %	Local production is mandatory to enjoy tariff benefits	Long – term validity

Table 2 demonstrates that barriers implemented by various countries exhibit a distinct «tariff escalation + localization requirement» dual characteristic. Unlike traditional approaches that simply raise tariffs, emerging markets generally set local production ratios as a prerequisite for preferential tax rates. This policy orientation is reshaping the overseas expansion model of Chinese automakers. According to the China Machinery Products Import and Export Association, in the first half of 2024, Chinese NEV enterprises announced a total of 17 overseas construction projects, with total investment exceeding 30 billion yuan, a 150 % increase compared to the same period in 2023. It is worth noting that the «cumulative effect» of technical trade barriers is intensifying – a single market often imposes multiple barriers such as tariffs, carbon footprint requirements, data security certifications, and localization rate constraints simultaneously, forming a «policy package». This cumulative effect is particularly detrimental to small businesses and new entrants. Large enterprises can share the compliance costs through their scale effect, while small and medium– sized enterprises are often forced to withdraw from highly regulated markets [43, p. 95].

The current global geopolitical landscape is complex and volatile, and regional competition has introduced significant uncertainty into the overseas expansion of China's NEVs. Factors such as the Ukraine conflict, Middle East instability, and major– power competition have directly or indirectly impacted overseas operations. First, the Ukraine conflict has disrupted land transportation routes through Ukraine, forcing some

ChinaEurope Railway Express lines to divert or suspend services [32, p. 58]. extending transit times by 10 – 15 days and increasing freight costs by approximately 20 %. Consequently, China's automobile exports to Russia declined significantly in 2025. Additionally, Western financial sanctions against Russia have affected settlement for Chinese automakers in the Russian market – some banks refuse to process Russia– related transactions, forcing enterprises to use third country or digital currency settlements, increasing compliance risks and exchange rate losses.

Second, the South China Sea issue and the spillover effects of Sino– US competition have also affected the Southeast Asian market. Although ASEAN countries generally maintain an open attitude toward Chinese NEVs, the US– promoted «Indo– Pacific Economic Framework» (IPEF) attempts to build an exclusionary system in the battery supply chain and encourages countries such as Vietnam and Indonesia to sign critical minerals agreements with the US [13, p. 3]. In March 2024, Indonesia signed a Critical Minerals Agreement (CMA) with the US, committing to strengthen controls on nickel exports and attract US enterprise investment. This is considered a measure to decouple from China in the battery supply chain. Consequently, Chinese enterprises face a more complex international environment when investing and building factories there. For example, a battery project jointly invested by CATL and Indonesia was required to add a compliance review process due to «attention» from the US. The project, with total investment of approximately $6 billion, aims to build a complete industrial chain from nickel mining to battery production. However, in May 2024, it was listed as a «key target» by the US Treasury Department, requiring the project party to provide detailed data security reports and supply chain traceability certificates, delaying the first phase of production until 2025.

NIO entered the Israeli market in 2022, relying on battery– swapping technology and premium positioning to gain initial recognition. However, in October 2023, a new round of the Israeli– Palestinian conflict led to a sharp deterioration in local security conditions, forcing NIO's experience center in Tel Aviv to close, disrupting battery swap station operations, and paralyzing the after– sales service system. Although NIO attempted to maintain basic operations through remote diagnosis and third– party towing services,

customer complaints surged, and sales dropped by 67 % in the first quarter of 2024. This case highlights the severe impact of geopolitical emergencies on overseas operations – even without direct trade barriers, political instability can destroy market demand and service networks.

NIO's experience in Israel reveals the mechanism of the impact of «non– traditional security threats» on enterprise operations in geopolitical risks. Unlike expected policy risks such as tariffs, geopolitical conflicts often have suddenness, unpredictability, and continuous impacts. For NIO, which has a differentiated competitive advantage based on battery swapping, the operational interruption of the battery swap network directly undermines the core of its business model – users purchasing NIO vehicles also purchase a complete set of charging service experience. When battery swap stations cannot operate due to safety reasons, the value of the product is greatly reduced, and customer complaints and brand reputation damage are inevitable. From a broader perspective, the long– term geopolitical complexity in the Middle East poses a continuous challenge to Chinese automakers. The region is not only an emerging market with significant growth potential for electric vehicles but also faces multiple risks such as sectarian conflicts, power games, and a single economic structure. How to find a balance between seizing market opportunities and managing geopolitical risks is a problem that Chinese automakers must carefully consider in their regional strategy formulation. The lesson from the NIO case is: overseas market risk assessment cannot be limited to the commercial level. Macro variables such as geopolitics and social security must be included in the analysis framework, and corresponding emergency plans and risk hedging mechanisms must be established.

In addition to traditional tariffs and geopolitical factors, the role of technical barriers to trade (TBT) is becoming increasingly prominent. The EU's «New Battery Regulation» (EU 2023/1542), which came into effect in August 2023, requires all EV batteries entering the EU market to provide carbon footprint declarations, conduct battery health status monitoring, and meet recycled material content targets (by 2030: cobalt ≥ 12 %, lithium ≥ 4 %). This regulation is the world's first law to impose mandatory supervision over the entire battery life cycle. Although Chinese battery enterprises dominate global production

capacity, they are still in a catching– up stage in terms of carbon footprint accounting methodologies and data traceability. According to the International Energy Agency (IEA), in 2023, Chinese battery production accounted for 78 % of the global total, but fewer than 5 third– party certification institutions recognized by the EU exist in China, far fewer than Germany's 20. According to industry research, the average carbon footprint of Chinese batteries is approximately 80– 100 kg CO_2/kWh, while the EU requires reduction to 60 kg CO_2/kWh or below by 2028, otherwise market access will be restricted. Companies such as CATL and BYD have begun to layout low– carbon battery production lines. For example, NIO's Yibin factory has achieved 100 % green power production, with unit product carbon emissions reduced to below 50 kg CO_2/kWh, but over 70 % of the industry's production capacity has not yet met the EU's 2028 standards [36, p. 52].

Charging interface standards are also important barriers. China's GB/T charging standard is incompatible with mainstream international standards such as CCS (Europe and America) and CHAdeMO (Japan). Although Chinese automakers adapt to local standards when exporting, charging station certification and communication protocols still require testing by local authoritative institutions, taking 6– 12 months and costing millions of RMB. The Japanese market requires unique «rapid charging equipment» safety certifications, and the process is extremely cumbersome.

As illustrated in Figure 3 (based on data from the China Automotive Technology and Research Center, 2024), the EU has the most comprehensive and strict requirements in terms of technical regulations, and Chinese enterprises face the highest compliance costs when entering the EU market (figure 4).

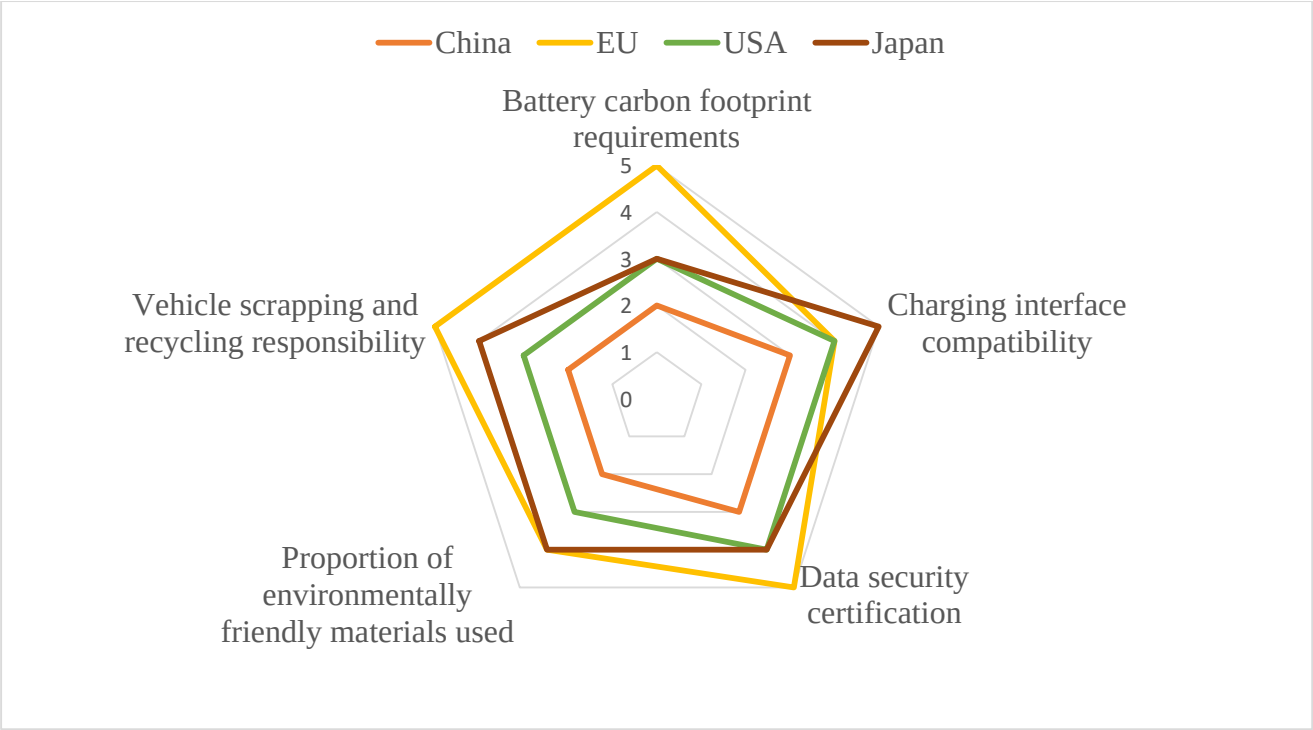

Figure 4 - Comparison of Technical Standards Differences in China's Main Export Markets for NEVs [39, p. 75]

Explanation: This chart visually demonstrates that the European Union has the most comprehensive and strict requirements in terms of technical regulations, and Chinese enterprises facing entry into the EU market encounter the highest compliance costs.

According to the China Automotive Technology and Research Center (CATARC), an export vehicle to the EU needs to meet over 200 technical regulations, an increase of 40 % compared to 2020. The proportion of compliance costs in the total vehicle cost has risen from 3 % to 8 %. Among them, the compliance costs for three new regulations carbon footprint accounting of batteries, software upgrade safety management (UN R156), and cybersecurity certification (UN R155) account for more than 50 %.

2.2 Challenges for Chinese Enterprises in the Overseas Market Adaptation

While the external policy environment is challenging, enterprises' insufficient adaptability in overseas markets is also a key internal factor restricting expansion. This section analyzes three dimensions: product localization adaptation, brand and channel

construction, and cross– cultural management.

The success of Chinese NEV enterprises in the domestic market largely depends on a deep understanding of local user demands, but this experience cannot be directly replicated overseas. Consumers in different countries and regions have significant differences in vehicle size preferences, range requirements, acceptance of intelligent functions, and expectations for after– sales service [34, p. 32] [28, p. 23].

Taking the European market as an example, users place greater emphasis on vehicle handling, use of environmentally friendly materials, and overall design quality. However, some early exported models from Chinese brands still adopted domestic popular elements such as large central control screens and colorful ambient lighting, which European users regarded as «over– designed. » According to a consumer survey published by German *Auto Bild* in March 2024, the evaluation criteria for car interiors in Europe ranked «material environmental friendliness» and «design simplicity» third and fourth respectively, behind «safety» and «comfort». The average scores of Chinese brands on these two indicators were only 6.2 and 5.8 out of 10, significantly lower than Tesla’s 8.5 and 8.2. Additionally, narrow European city streets and ancient parking spaces impose strict restrictions on vehicle width [24, p. 45]. while popular Chinese SUV models (e.g., BYD Yuan PLUS, width 1875mm) face difficulty passing through and parking in some old European urban areas. For example, in the historic district of Rome, Italy, the average street width is only 3.2 meters, while Chinese SUVs generally exceed 1.85 meters in width, and with side mirrors added, total width exceeds 2.1 meters, making passage and parking extremely inconvenient.

In the Southeast Asian market, consumers are extremely price– sensitive, and the hot and humid climate imposes higher demands on battery thermal management. Some studies have pointed out that when Chinese brand EVs are used in Thailand, the air conditioning system load is high, resulting in a real– world range reduction of more than 30 % compared to the nominal range. Local users often lack home charging piles and are more concerned about fast charging frequency and battery lifespan. A user satisfaction survey released by the Thai Electric Vehicle Association (EVAT) in May 2024 showed that range anxiety is the biggest pain point for Thai EV users, with 67 % of users reporting

a gap of more than 25 % between actual and nominal range. Chinese brand models perform worse than Japanese and Korean brands in tropical regions because their battery thermal management systems are designed primarily for low– temperature environments [33, p. 115].

Weak brand influence is a common problem faced by almost all Chinese NEV enterprises. According to data released by market research institution YouGov in 2025, in the German market, prompted brand awareness of Chinese brands (such as BYD, NIO, and XPeng) is only 28 %, while Tesla has 85 % and Volkswagen 82 %. This gap in brand recognition directly affects consumers' purchasing decisions – many European users are concerned about the safety, resale value, and service reliability of Chinese vehicles [27, p. 40]. The optimization study of S Company's marketing strategy indicates that enhancing brand awareness requires long– term localized investment, while building brand premium value capacity necessitates a relatively long period of trust accumulation.

The low brand awareness reflects a regular predicament faced by multinational enterprises in brand building. Automobiles are high– involvement, long– decision– cycle consumer goods, and establishing brand awareness requires long– term continuous investment. Multinational car companies such as Toyota and Volkswagen have cultivated their brand assets in the European market for decades or even centuries, based on generational product reputation and continuous market communication. Chinese car companies have only been in the European market for a few years, facing a natural disadvantage in the time dimension of brand building. Moreover, Chinese car brands have long presented a low– price image in overseas markets, and the «low price, low quality» label from the early fuel vehicle export era persists in some consumers' perceptions. Breaking this stereotype requires a systematic brand communication strategy, not merely advertising.

In terms of marketing channels, most Chinese enterprises rely on local dealers or import agents, lacking their own experience centers and direct sales networks. This model reduces initial investment but leads to distorted brand image transmission [25, p. 55]. inconsistent prices, and uneven service standards. For example, a Chinese brand in France cooperated with a small dealer group that also sold multiple low– end brands, resulting in

Chinese models being displayed in corners and salespeople lacking enthusiasm for promotion. In contrast, Tesla and NIO adopted a direct sales + online reservation model in Europe, which can unify brand experience and directly obtain user data. Research on China's export of new energy vehicles in the context of RCEP indicates that channel construction is a weak point that hinders the overseas expansion of small and medium–sized enterprises. Establishing an independently controllable sales network is conducive to enhancing brand consistency and user loyalty [25, p. 80]. As shown in Figure 5 (based on YouGov data, 2025), brand awareness of Chinese brands is relatively higher in Southeast Asia (Thailand), mainly due to earlier entry and intensive advertising campaigns; however, in mature European markets, brand awareness is generally below 30 %, significantly lower than that of Tesla and local brands (figure 5).

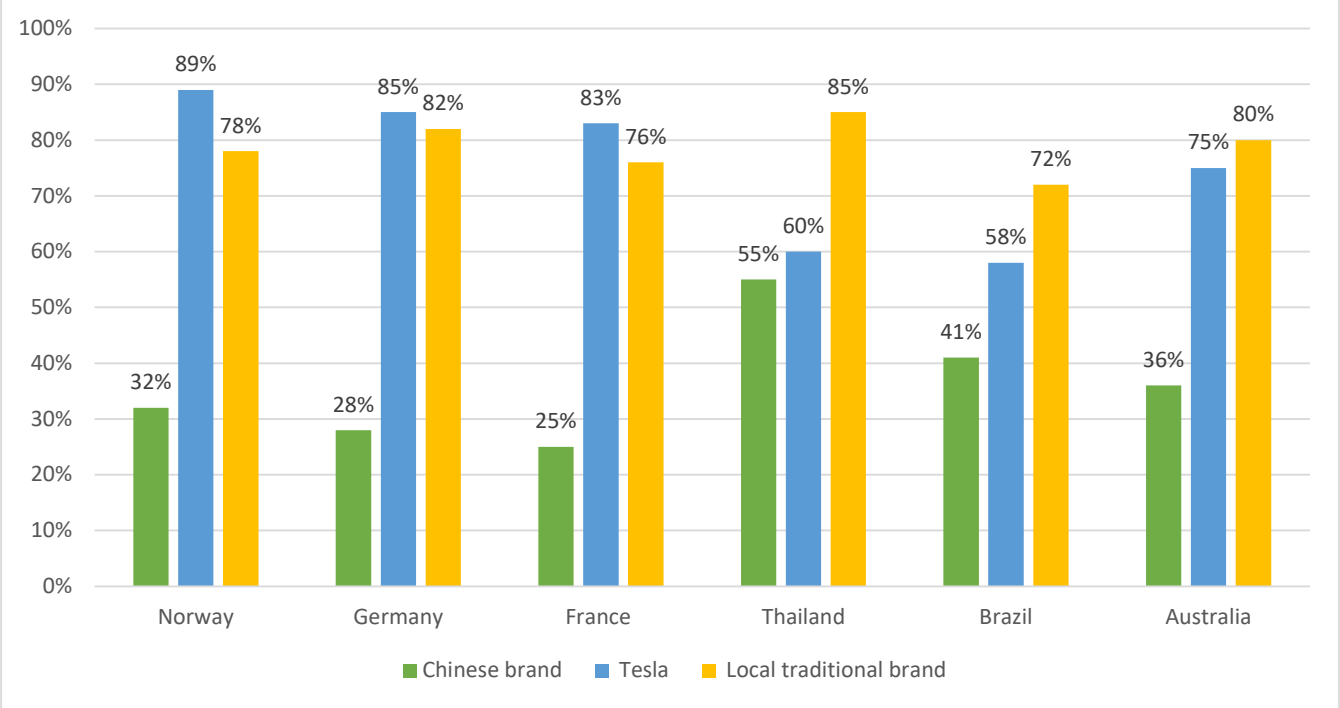

Figure 5 - Comparison of Brand Awareness of Chinese NEV Brands and Mainstream Brands in Major Markets (2025) [25, p. 80]

From the figure, it can be seen that the brand awareness of Chinese brands is relatively higher in Southeast Asia (Thailand), mainly due to their earlier entry and intensive advertising campaigns. However, in the mature European markets, the brand

awareness is generally below 30 %, significantly lower than that of Tesla and local brands. In the Norwegian market, thanks to the earlier market entry and active marketing strategies, NIO and Xpeng have achieved brand awareness of 45 % and 38 % respectively, significantly higher than other European markets, but still far below Tesla's 88 %. This comparison indicates that continuous brand investment and local communication are effective ways to enhance brand awareness.

The operation and management of overseas branches involve multiple challenges, including cultural differences, labor regulations, and community relations. Many Chinese enterprises, when initially «going global», are accustomed to sending domestic managers for long– term overseas assignments, but these personnel often lack local language skills and cross– cultural communication abilities, resulting in communication barriers with local employees, government agencies, and consumers.

In terms of human resource management, some enterprises attempt to transplant domestic «996» culture or performance assessment methods to overseas markets, leading to labor disputes. For example, a Chinese car company, after setting up a component factory in Spain, required workers to work on weekends without paying double wages according to local standards. The company was ultimately sued by the trade union and fined up to €2 million. Additionally, enterprises in Europe often face powerful trade unions, and Chinese management teams lack understanding of collective bargaining mechanisms, often finding themselves in a passive position. The research on the marketing strategy of C brand's new energy vehicles indicates that the localization management level of cross– cultural teams directly affect the operational efficiency of overseas branches, and respecting the local labor culture is the basic prerequisite for cross– border operations [11, p. 32] [60, p. 17].

The deeper challenge of cross– cultural management lies in the fundamental differences in management concepts. The management culture of Chinese enterprises emphasizes execution, efficiency, and result orientation, with performance assessment and salary incentives closely linked. The management culture of European enterprises places more emphasis on work– life balance, employee participation, and the collective negotiation mechanism of trade unions. When the two management cultures collide, if the

Chinese management team adopts a simple transplantation of management methods, it is very likely to trigger labor conflicts. In the case of the factory in Spain, the Chinese managers believed that working on weekends was a necessary measure to cope with peak orders and were willing to pay overtime pay. But according to the regulations of Spanish labor law, working on weekends not only requires double pay but also needs to obtain the consent of the trade union and ensure the rest rights of employees. The «good intentions» of the Chinese management team, due to a lack of understanding of local labor regulations, ultimately turned into a compliance crisis. The lesson from this case is: The management of overseas factories must follow the principle of «legal bottom line + cultural adaptation», strictly abide by local labor laws, and respect the traditional labor relations in the local area, and cannot simply apply domestic management experience. More importantly, cross–cultural management requires a «two– way understanding» basis – not only must the Chinese managers learn the local culture and language, but also help local employees understand the management concepts and development vision of Chinese enterprises, forming a common work goal and cultural identity.

The MG brand under SAIC Group (formerly British Rover) has a design center in Birmingham. In response to salary increase demands raised by the British trade union Unite, SAIC Group's management adopted an active communication strategy: they hired local experienced labor relations consultants and held regular employee meetings. Eventually, they reached a three– year flexible salary agreement, linking salary increases to production efficiency. This approach not only prevented a strike but also improved employee satisfaction. This case demonstrates that respecting local labor culture and introducing professional support can effectively resolve cross– cultural conflicts.

The successful practice of SAIC Group in handling union relations in the UK provides valuable experience for enterprises going global in cross– cultural management. The core strategy can be summarized as «professional support + institutionalized management + shared interests». First, they hired local senior labor relations consultants to help the Chinese management accurately understand the operation rules of British labor relations, avoiding management mistakes caused by information asymmetry. Secondly, they established regular employee meetings and union joint meetings to institutionalize

and normalize labor– management communication, preventing problems from accumulating to the point of a conflict. Finally, they linked salary adjustments to production efficiency, responding to employees' salary increase demands while also motivating efficiency improvement, achieving a win– win situation for both labor and management. The key insight of this case is: the cross– cultural management of multinational enterprises cannot rely on the personal charm and on– the– spot adaptability of managers, but should establish systematic management mechanisms and professional support systems. From a broader perspective, the core of cross– cultural management is the dialectical unity of «localization of systems» and «integration of culture» fully localizing core systems such as labor employment, salary benefits, and employee relations, and gradually integrating in terms of soft aspects such as corporate vision, management philosophy, and team culture, to form a management model with Chinese roots and adapted to global operations.

2.3 Shortcomings in Supply Chain «Going Global» and International Operations

The low level of supply chain internationalization and lack of international operation experience constitute the third major constraint on the overseas expansion of China's NEVs. This section examines three aspects: reliance on domestic sources for core components and logistics, weak overseas production layout, and international operation and compliance risks.

Although China has world– leading production capacity and technology in batteries, motors, and electronic control (the «three– electric» systems), high– end chips (such as IGBTs and MCUs), some valves in thermal management systems, and high– speed bearings still rely on imports or are supplied by foreign enterprises operating in China (Fan, 2012). This «external bottleneck» poses potential risks to the supply chain if international relations deteriorate or overseas suppliers are cut off, domestic vehicle enterprises' overseas orders will be impacted. Research on supply chain coordination mechanisms indicates that the external dependence on core components is a key weak link that restricts

the security of the industrial chain. This issue needs to be addressed through domestic substitution and diversified procurement [10, p. 6] [49, p. 25].

The more prominent shortcoming is logistics transportation capacity. The export of NEV complete vehicles primarily relies on specialized roll– on/roll off (Ro– Ro) ships (PCTCs), and global Ro– Ro shipping capacity has been continuously tight since 2021. According to statistics, although global Ro– Ro ship orders increased in 2024, the delivery cycle was as long as 2 – 3 years. Chinese shipowners hold less than 10 % of global Ro– Ro capacity, with most capacity controlled by Japanese, Norwegian, and South Korean shipowners [26, p. 55].

This led to the Ro– Ro freight rate from Shanghai Port to Europe soaring from $30 per cubic meter in 2020 to $120 in 2024, with transportation cost per vehicle reaching $2,000 - 3,000. Some enterprises attempted to use container transportation, but loading and unloading efficiency was low, and vehicles were prone to damage. As shown in Figure 6 (based on industry data), freight rates for major routes have fluctuated significantly, with the China– Europe route experiencing the most dramatic increase (figure 6).

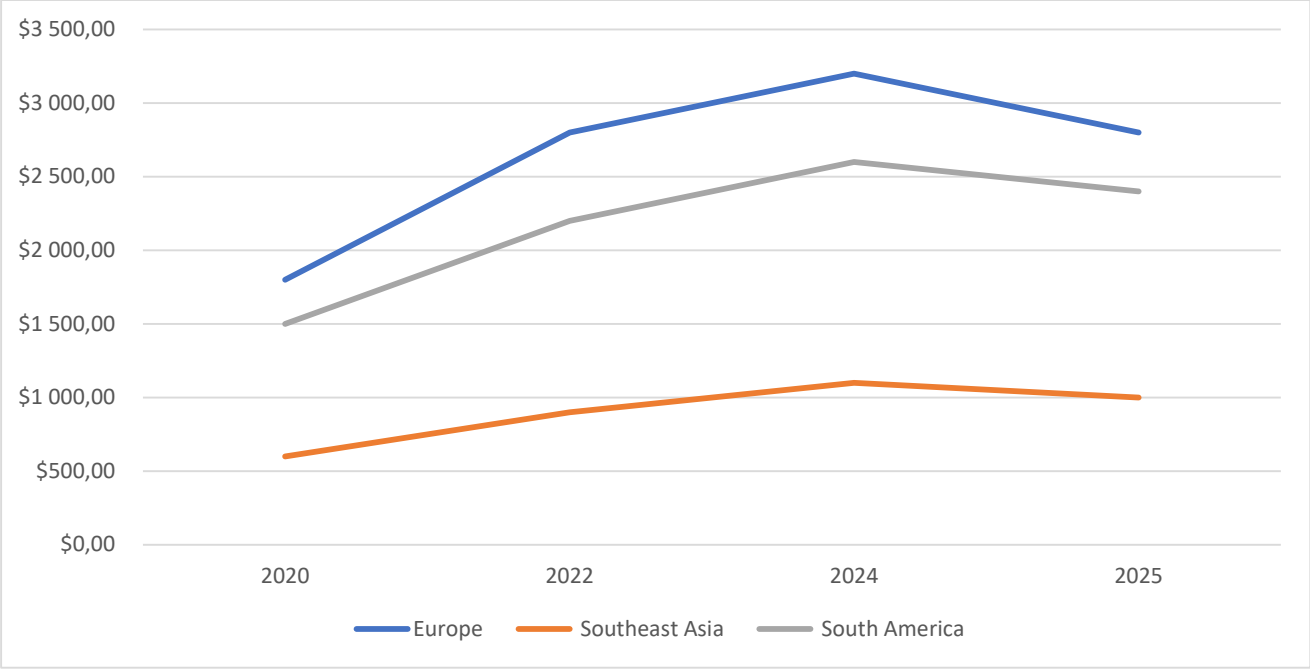

Figure 6 - Trend of Freight Rates for Major Routes of China’s NEV Exports (2020– 2025) [25, p.81]

To alleviate the capacity bottleneck, BYD announced in 2023 that it would order 8 large Ro– Ro ships, each capable of carrying 7,000 vehicles, with total investment of approximately 5 billion yuan. The first ship, «Explorer 1», was officially put into operation in August 2024, primarily serving the China– Europe route. Building its own fleet reduced BYD's per– unit transportation cost by approximately 35 % and made the transportation cycle controllable. However, this strategy requires huge capital investment, making it difficult for small and medium– sized enterprises to follow suit

Compared with multinational car manufacturers such as Volkswagen and Toyota, which have dozens of factories across multiple continents, the overseas manufacturing bases of Chinese NEV enterprises are still in the initial stage. As of now, only a few overseas passenger vehicle factories have truly achieved mass production, such as BYD's Thailand factory (production began July 2024, annual capacity 150,000 units), Great Wall Motors' Rayong factory in Thailand (originally a General Motors factory, annual capacity 80,000 units), and SAIC– CP's Thailand factory. In the European market, apart from the BYD factory in Hungary under construction, most other enterprises have only attempted small– scale production in the form of CKD (complete knock– down) or SKD (semi– knock– down) assembly, with limited production capacity [23, p. 58].

The lack of local production brings multiple problems: First, it cannot avoid the aforementioned tariff barriers. For example, before BYD's Hungary factory begins production, vehicles exported to the EU must pay high anti– subsidy duties. Second, responsiveness to market demand is slow, making it difficult to quickly adjust vehicle configurations based on local user feedback. Third, the supply cycle for after– sales parts is long, often requiring sea or air transportation from China, resulting in maintenance waiting times of up to several weeks [40, p. 60] [41, p. 2]. From the perspective of both scientific research breakthroughs and industrial breakthroughs, the overseas production capacity layout lags behind the growth of export scale. However, based on data analysis, it is indicated that local production in overseas markets has a significant impact on the speed of demand response.

Nio Auto (Hozon New Energy) collaborated with Thailand's Bangchan General

Assembly Company in 2023 to assemble the Nio V model in CKD form. Although this avoided some vehicle tariffs, due to the lack of a mature component supply system locally, most core components still needed to be imported from China, resulting in high assembly costs. At the same time, the Thai factory's capacity utilization rate was long– term below 40 %, unable to achieve scale effects. This case shows that simple CKD assembly is not equivalent to true local production. Competitiveness can only be formed by driving upstream component enterprises to go overseas.

Cross– border operations involve a series of complex matters, including exchange rate risk management, cross– border tax planning, intellectual property protection, and data security compliance. However, most Chinese NEV enterprises lack corresponding experience and professional teams.

In terms of exchange rate risk, Chinese car manufacturers usually settle exports in US dollars or euros, while costs are denominated in RMB. During 2022– 2024, the fluctuation range of the RMB against the US dollar exceeded 10 %. Some enterprises, due to not conducting hedging, suffered exchange losses that eroded all profits. For example, an enterprise’s export order to Brazil in 2023 was affected by significant depreciation of the Brazilian real, resulting in a 15 % reduction in local currency revenue and ultimately a project loss.

In terms of data compliance, the EU’s General Data Protection Regulation (GDPR) is extremely strict. Intelligent connected vehicles collect large amounts of user location information and driving behavior data. If explicit user consent is not obtained or cross– border transmission is not compliant, a fine of up to 4 % of global annual turnover can be imposed. In 2024, a Chinese brand was fined €400,000 by the Dutch Data Protection Authority for the vehicle’s cameras collecting faces of passers– by without consent in the Netherlands. Additionally, the proposed US «Protect American Data from Foreign Interference Act» also creates obstacles for Chinese car companies to obtain data from American users. Table 2.5 summarizes the core weaknesses and key impacts of Chinese NEV enterprises' overseas operations [26, p. 18]. Research on supply chain coordination under the dual– integration policy indicates that data security compliance will become a new barrier for cross– border operations. Enterprises need to establish a compliance

framework between local data storage and cross– border transmission (table 5).

Table 5 – Core Weaknesses and Key Impacts of Chinese NEV Enterprises' Overseas Operations [39, p. 67]

Core weaknesses	Key impacts
Core components rely on (chips, etc.)	Delivery delays, breach compensation
Logistics capacity bottleneck (roll– on/roll– off ships)	Transport disruptions, customer loss
Weak overseas production capacity	Tariff pressure, profit decline
Data compliance risks	High fines, access restrictions
Lack of management for exchange rate fluctuations	Exchange rate losses, project losses

Based on the above analysis, Chinese NEVs face three intertwined constraints during overseas market expansion. First, macro– environmental pressure from external policy barriers and geopolitical risks. Second, enterprises' lack of adaptability in product adaptation, brand channels, and cross– cultural management. Third, structural weaknesses from the low degree of supply chain internationalization and lack of international operation experience. These three factors reinforce each other. For example, tariff barriers directly increase costs, but if enterprises have overseas factories and a mature supply chain layout, they can effectively mitigate such risks. Therefore, solving the problem of overseas expansion requires systematic strategies, including promoting standard internationalization, deepening local R&D and production, building resilient supply chains, and cultivating international operation teams.

Chapter 3 Optimization of Strategies for the Expansion of China's New Energy Vehicles in Overseas Markets

3.1 International Standard Management and Optimization of Technical Paths

In the context of the global automotive industry's green and low– carbon transition and intensifying geopolitical competition, China's NEV industry, leveraging continuous technological innovation and complete industrial chain advantages, has become an important force leading the global automotive industry transformation. However, as major markets such as Europe and the United States have successively introduced trade barriers including carbon tariffs and anti– subsidy investigations, Chinese NEV enterprises face increasingly complex compliance requirements and technical standard challenges in their overseas market expansion. This chapter, based on industrial innovation system theory and supply chain resilience theory, systematically explores optimization paths for China's NEV overseas market expansion strategies from three dimensions: international standard management, green supply chain construction, and differentiated market strategies.

International standard management is a key link for Chinese NEV enterprises to break through technical barriers in overseas markets. Currently, developed countries in Europe and America are accelerating the establishment of a new trade rule system centered on carbon emissions. The implementation of the EU's Carbon Border Adjustment Mechanism (CBAM) and the «New Battery Regulation» has raised higher requirements for the product life cycle carbon footprint management of Chinese NEV enterprises. Studies have shown that China's NEV industry standardization still faces problems such as an incomplete standard system and insufficient participation in international standards [44, p. 213]. Research on the impact of technological innovation on exports indicates that the discourse power over standards is a fundamental factor determining a company's international competitiveness. Only by deeply participating in the formulation of international standards can one fundamentally break through technical trade barriers. Therefore, enterprises need to enhance their international standard management capabilities from three aspects: technical standard alignment, carbon footprint accounting

system construction, and optimization of core technology paths.

There are significant differences in key NEV standards among China, the European Union, and the United States, mainly in areas such as battery specifications, charging interfaces, and carbon footprint accounting methods. As presented in Table 3.1, significant differences exist between Chinese standards and those of Europe and the US in terms of charging interfaces and carbon footprint accounting. Therefore, Chinese enterprises can adopt a strategy of «market– specific adaptation» combined with «active participation». In the EU market, they should prioritize the use of CCS interfaces and conduct Product Environmental Footprint (PEF) certification, while actively participating in discussions on charging standard integration at the International Organization for Standardization (ISO/IEC) and promoting the «ChaoJi» charging standard as a new internationally recognized solution. [47, p. 62].

Table 6—Comparison of Technical Standards Differences in Major NEV Markets [47, p. 63]

Standard fields	China	European Union	The United States
Charging interface	GB/T 20234, ChaoJi is gradually being promoted	CCS Type2	CCS Type1 / NACS
Battery safety	GB 38031– 2020	UN R100, R136	FMVSS 305
Carbon footprint calculation	LCA Method (Under Discussion)	PEF method, EU Battery Regulation	GREET model
Battery recycling regulations	Temporary Measures for Recycling (2018)	New Battery Law (2023/1542)	State legislation (such as California SB 1215)

From Table 6, it can be seen that significant differences exist between Chinese standards and those of Europe and the US in terms of charging interfaces and carbon footprint accounting. Therefore, Chinese enterprises can adopt a strategy of «market–specific adaptation» combined with «active participation». In the EU market, they should prioritize the use of CCS interfaces and conduct Product Environmental Footprint (PEF) certification, while actively participating in discussions on charging standard integration at the International Organization for Standardization (ISO/IEC) and promoting the «ChaoJi» charging standard as a new internationally recognized solution.

Mutual recognition of carbon footprint accounting is a technical prerequisite for

breaking through carbon tariff barriers. Enterprises should establish a carbon footprint accounting system covering the entire life cycle from raw material procurement, production, transportation and distribution, to use and recycling. The specific process is shown in Figure 3.2. Enterprises need to introduce internationally recognized carbon accounting methodologies and data platforms (such as GaBi, SimaPro), and entrust third–party institutions for verification to ensure traceability and international mutual recognition of carbon footprint data. Taking power batteries as an example, the EU's «New Battery Regulation» requires that carbon footprint levels of batteries must be labeled starting in 2026. Chinese enterprises should prepare in advance and establish battery– level carbon footprint accounting capabilities. Research on the challenges of deep low– carbon development indicates that the establishment of carbon footprint accounting capabilities is not merely a passive response to compliance requirements, but rather a strategic investment for enterprises to build long– term green competitive advantages (figure 7).

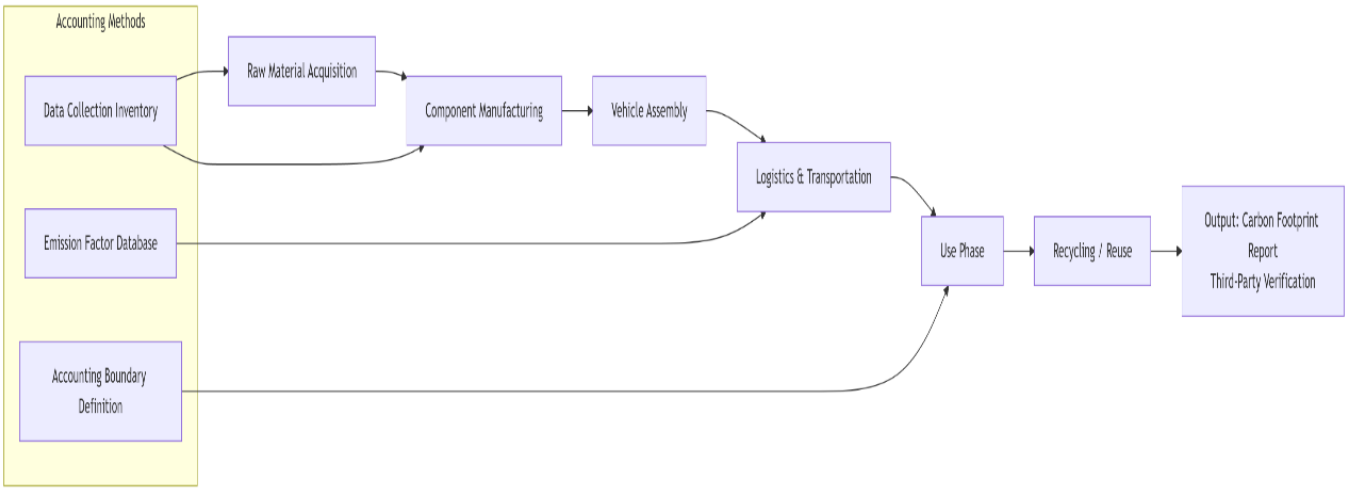

Figure 7 - Schematic Diagram of Carbon Footprint Calculation Process for the Entire Lifecycle of NEVs [59, p. 116]

Figure 7 presents the complete accounting chain from «cradle to grave». Enterprises need to introduce internationally recognized carbon accounting methods and data platforms (such as GaBi, SimaPro), and entrust third– party institutions for verification to ensure the traceability and international mutual recognition of carbon footprint data.

Taking power batteries as an example, the EU's «New Battery Law» requires that starting from 2026, the carbon footprint level of batteries must be labeled. Chinese enterprises should make preparations in advance and establish battery– level carbon footprint accounting capabilities.

Technological innovation is the fundamental path to break through standard barriers [47, p. 30]. Enterprises should increase investment in core technologies such as solid– state batteries, efficient electric drive systems, and lightweight materials, reducing the carbon intensity of products from the technical source. At the same time, in response to EU market requirements for battery recycled content (by 2028: recycled cobalt ≥ 25 %), enterprises need to develop battery structures that are easy to disassemble and recycle, forming a collaborative optimization path of «technical design – low– carbon manufacturing – closed– loop recycling» [48, p. 45]. Studies on supply chain resilience have shown that external pressures can be transformed into the internal driving force for enterprises' technological innovation. Tariff measures have compelled Chinese automakers to accelerate technological upgrades and global expansion, forming a positive cycle of «promoting innovation through pressure» [62, p. 55].

It is worth noting that the economic effect assessment of imposing tariffs on China's new energy vehicles by Europe shows that although the tariff measures temporarily inhibited the market expansion of Chinese products, they also forced Chinese enterprises to accelerate technological upgrading and global supply chain layout. For example, some leading enterprises have established R&D centers in Europe, developing specialized vehicle models according to local standards, effectively reducing the impact of trade frictions.

3.2 Building Green Supply Chains and Enhancing International Compliance Capabilities

Building green supply chains is the core support for enhancing the international compliance capabilities of Chinese NEV enterprises. In the context of global supply chain restructuring and rising trade protectionism, supply chain resilience has become a key

factor affecting the stability of NEV exports [53, p. 25]. Research has found that China’s NEV industry chain still has external dependencies in key materials (such as lithium, cobalt, and nickel) and core components (such as automotive– grade chips and high– end IGBTs), and supply chain controllability needs improvement. Research on the export of China's new energy vehicles in the context of the EU's carbon tariffs indicates that technical trade barriers and standard breakthroughs are the core challenges currently faced, while the construction of a green supply chain is a systematic solution to address these challenges. From the perspective of dual cycles, the discussion on export opportunities and challenges further indicates that the green transformation of the supply chain is not only a compliance requirement, but also a strategic choice for enhancing international competitiveness [57, p. 56]. Therefore, enterprises need to optimize supply chain strategies from three dimensions: green supplier management, supply chain risk warning, and reverse logistics system construction.

Green supplier management requires enterprises to incorporate environmental performance into supplier selection and assessment systems, and encourage upstream enterprises to carry out carbon reduction and clean production renovations. By establishing a supplier environmental information disclosure mechanism and a tiered management system, carbon emission control across the entire supply chain can be achieved. Table 3.3 lists the main risk factors and response strategies at each stage of the supply chain.

Table 7 – Risk Factors and Response Strategies of the NEV Supply Chain [29, p. 13]

Supply chain segments	Main Risks	Response strategies
Upstream minerals and battery materials	Geopolitical risks, price fluctuations, ESG controversies	Diversified procurement, strategic inventory management, development of recycled materials
Cell and module manufacturing	Fast technological evolution, insufficient production capacity	Combination of self– research and cooperation, modular design
Vehicle– grade chips	Trade restrictions, supply shortages	Domestic substitution, multi– source procurement, buffer inventory
Vehicle logistics and overseas warehouses	Tight transportation capacity, carbon tariffs, port congestion	Roll– on/roll– off ships + overseas warehouses, China– Europe rail lines, localized KD assembly

From Table 7, it can be seen that supply chain risks exhibit multi– level and dynamic characteristics. Enterprises need to establish a risk list covering all links and formulate emergency plans for high– risk links. An in– depth study on the competitiveness of BYD shows that the level of differentiation in supply chain risk management constitutes the dividing line for enterprise competition. Leading enterprises have already developed systematic capabilities in diversified procurement and strategic inventory management [29, p. 13].

Enterprises should establish a supply chain risk warning and emergency response mechanism, and utilize big data and blockchain technology to achieve full– process visualization of the supply chain, enhancing the ability to identify and respond to geopolitical risks and logistics disruption risks. Specific measures include: establishing a supplier credit rating and dynamic monitoring system; using satellite remote sensing data to track the transportation status of key minerals. And signing long– term freight rate agreements with shipping companies to ensure logistics channels. Research on the promotion paths of high– speed exports indicates that the enhancement of supply chain visualization capabilities enables enterprises to identify risks in advance and take preventive measures, thereby reducing the impact of external shocks on export stability [51, p. 5].

The improvement of international compliance capabilities also requires attention to product recycling and battery closed– loop management. The EU's «New Battery

Regulation» has strict regulations on battery carbon footprint, recycling rates, and recycled material content, requiring Chinese enterprises to establish cross– border battery recycling networks and reverse logistics systems. Enterprises can achieve the legal requirements of target markets for battery recycling through cooperation with overseas local recycling enterprises (such as Umicore in Belgium, BASF in Germany) or by establishing their own recycling networks, while also achieving recycling of key materials and reducing raw material supply risks. Figure 8 depicts the overall framework of green supply chain management [63, p. 52]. Research on supply chain risks and management in the context of globalization indicates that the internationalization of the recycling system is a key aspect of the green supply chain (figure 8).

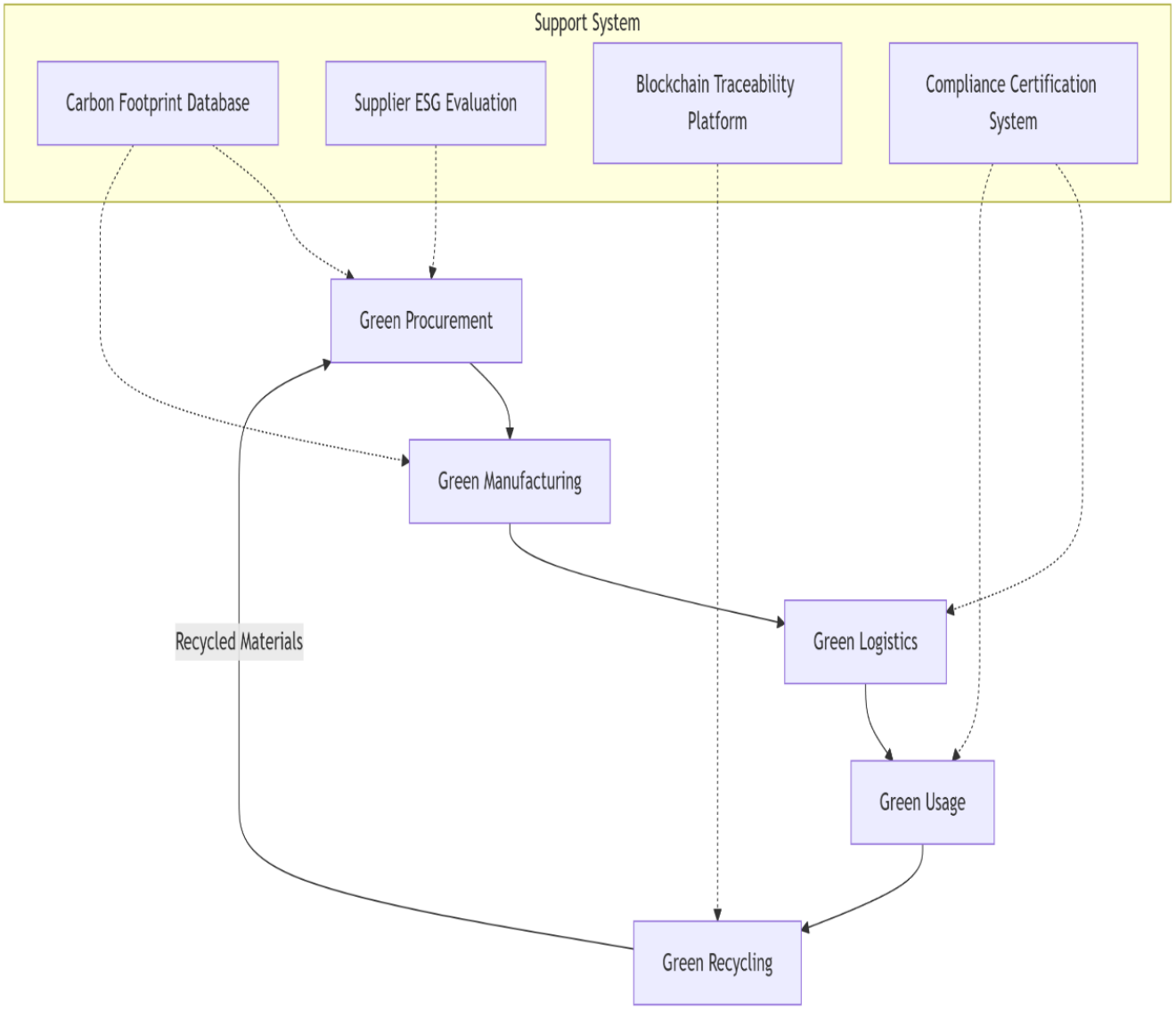

Figure 8 — Framework for Green Supply Chain Management NEV [63, p. 52]

Figure 8 highlights the integration of closed– loop flow with digital support. Additionally, supply chain enterprises should enhance their integrated service capabilities, shifting from the supply of individual components to modular and system– based solutions, and strengthening their irreplaceability in international division of labor. In the overseas logistics process, enterprises should optimize transportation routes and warehouse layouts, and explore a model combining «roll– on/roll– off transportation with overseas warehouses» to reduce logistics costs and carbon emission intensity. The research on the reconstruction path of the industrial chain indicates that greenification and digitalization are the dual driving forces for the upgrading of the supply chain. Enterprises need to simultaneously advance in areas such as carbon footprint tracking, supplier environmental performance assessment, and the construction of reverse logistics systems [54, p. 32].

Another key dimension of green supply chain construction is «global layout of reverse logistics and battery recycling systems». According to the EU's «New Battery Regulation» (EU 2023/1542), starting from 2027, the recycling rate of power batteries must reach over 90 %, and the recycling rates of key materials such as cobalt, lithium, and nickel must be no less than 90 %, 70 %, and 95 % respectively. This means that batteries exported to the EU must establish or cooperate in establishing recycling channels locally. Currently, Chinese enterprises mainly have three response models: First, they establish strategic cooperation with local recycling giants in Europe (such as Umicore in Belgium and BASF in Germany), leveraging their mature recycling networks to achieve compliance. Second, they establish a «production– use– recycling– renewal» closed– loop system in overseas factories, such as the battery recycling production line planned by Ningde Time in the Thuringia region of Germany. Third, they acquire overseas recycling technologies and channels through investment and acquisition, such as Ganfeng Lithium's acquisition of a portion of the equity of a Dutch recycling company. Each of these models has its own advantages and disadvantages in terms of cost– effectiveness, but the core trend is clear: Battery recycling capabilities are shifting from being a «cost center» to a «competitive barrier» – enterprises with complete closed– loop capabilities will gain dual advantages in terms of stable raw material supply and compliance with carbon footprint regulations.

3.3 Differentiated Market Strategies and International Communication Paths for Green Brands

Differentiated market strategies and international communication paths for green brands are important guarantees for the sustainable development of China's NEV market in overseas markets. Research shows that the Chinese automotive market is characterized by simultaneous scale expansion and structural optimization, and this trend extends to the field of overseas market expansion. Facing policy environments, consumption preferences, and infrastructure differences in different regional markets, Chinese enterprises need to adopt «country– specific» differentiated market strategies.

In mature markets (such as the European Union), enterprises should focus on green compliance and technological leadership in brand positioning, highlighting the competitive advantages of their products in terms of energy efficiency, intelligence, and carbon footprint, and reducing trade barriers through local production and R&D collaboration [52, p. 2] [46, p. 88]. An analysis of the international competitiveness of China's new energy vehicle industry reveals that differentiated market strategies are an effective way to address regional market heterogeneity. In mature markets, enterprises should focus on building brand premium capabilities rather than engaging in mere price competition. In emerging markets (such as Southeast Asia), enterprises can rely on the China– ASEAN industrial cooperation framework to promote the «Chinese + NEV» vocational education and training project, solving the problem of insufficient local after– sales service capabilities while enhancing brand affinity [50, p. 40]. The exploration of the «Chinese + New Energy Vehicles» vocational education and training model for China– ASEAN countries indicates that talent cultivation is an important support for brand localization. Through technical training, both service shortcomings and brand recognition issues can be addressed simultaneously. There is a synergy between infrastructure construction cooperation and product exports. Enterprises should fully utilize this policy platform [55, p. 15]. The research on the marketing strategy of the C brand indicates that in the countries along the «Belt and Road Initiative», enterprises can adopt a packaged output model of «products +

standards + services» to form a systematic market entry strategy [60, p. 12]. Table 8 summarizes the specific strategy combinations for the three major regions.

Table 8 – Comparative Analysis of Differentiation Strategies for Major Overseas Markets of China's NEVs [60, p. 12]

Dimension	EU market	Southeast Asian market	«Along the Belt and Road»
Market positioning	High– end, green technology	Good value for money, practical and durable	Mid– range, adaptable products
Core advantage	Low carbon footprint, intelligent driving	Low price, convenient charging	Durability, multi– terrain adaptability
Key points of standard compliance	CBAM, new battery regulations, UN laws	ASEAN Mutual Recognition Standard (ACMA)	Import certification from target countries
Sales and channels	Direct sales + authorized distribution	Dealer agency, B– end cooperation	Government procurement, infrastructure– for– products swap
Brand communication	Zero emissions, technological innovation	Economical and low operating cost	Reliable, win– win cooperation
Localization of talents	Establish a research and development center	«Chinese + New Energy» training	Joint factory establishment, operation and maintenance training

The optimization of international communication pathways for green brands needs to be carried out from three aspects: content strategy, channel strategy, and evaluation system. Research on the influencing factors of export trade under the new development pattern indicates that the establishment of a green brand image helps to reduce consumer cognitive barriers. Especially in markets with strong environmental awareness such as Europe, low– carbon certification and green narratives can become important means for differentiated competition [32, P. 2].

At the content strategy level, enterprises should abandon the traditional product function promotion model and shift to green content dissemination centered on the concept of sustainable development. Specifically, they can disclose product life cycle carbon footprint data, showcase green factories and clean production processes, and tell stories

about low– carbon travel, building a credible and transparent green brand image [54, p. 31]. Research shows that consumers are increasingly sensitive to the authenticity of a brand's green commitment, and exaggerated promotion may trigger «greenwashing» controversies, which instead damage brand reputation. Therefore, enterprises should actively publish annual ESG reports and invite third– party institutions to verify carbon emission reduction achievements.

At the channel strategy level, enterprises should integrate diverse communication channels such as international social media (e.g., YouTube, TikTok, Instagram), industry exhibitions (e.g., Munich Motor Show, Geneva Motor Show), and professional evaluation institutions (e.g., Euro NCAP, Green NCAP), forming a three– dimensional brand communication network. At the same time, they should actively cooperate with local environmental protection organizations, industry associations, and opinion leaders, leveraging third– party endorsements to enhance the credibility of brand information. The discussion on the «new overseas expansion» strategy indicates that Chinese automakers need to establish a diversified brand communication matrix in the overseas market. Simply relying on advertising is insufficient to build a deep brand recognition. It is necessary to combine local content creation and community operation [65, P. 4].

At the evaluation system level, enterprises need to establish a framework for assessing the effectiveness of international brand communication, incorporating brand awareness, green image recognition, and consumer purchase intentions into key performance indicators to achieve dynamic optimization of communication strategies. Research on the new trends of global cooperation indicates that Chinese new energy vehicle enterprises should enhance collaborative brand promotion with overseas partners, and improve the credibility and influence of the brand through joint marketing and technological cooperation (figure 9) [30, P. 79].

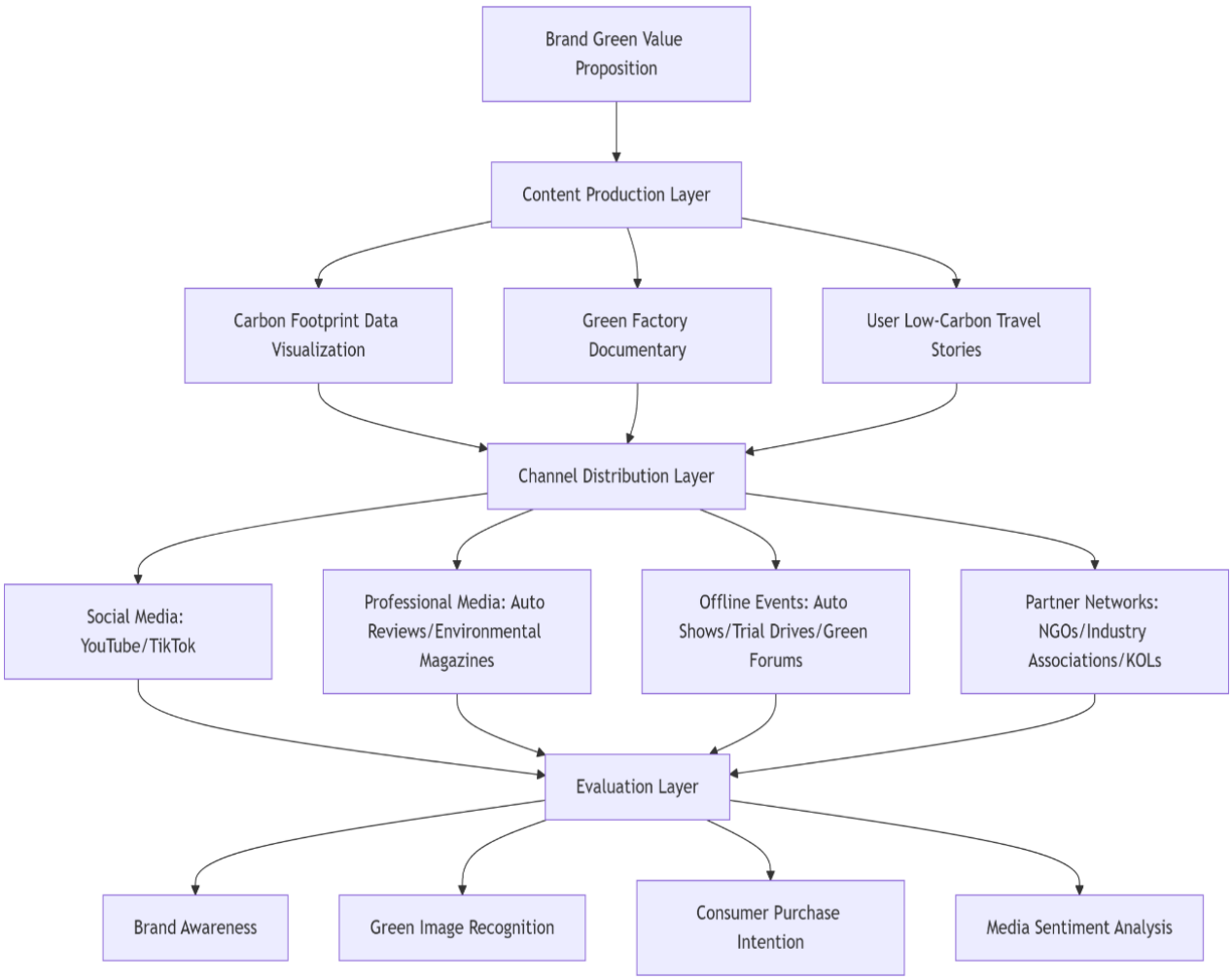

Figure 9 - Schematic Diagram of Green Brand International Communication Pathway [30, P. 79]

At the evaluation system level, enterprises need to establish a framework for assessing the effectiveness of international brand communication, incorporating brand awareness, green image recognition, and consumer purchase intentions into key performance indicators to achieve dynamic optimization of communication strategies.

The implementation of differentiated market strategies also needs to pay attention to prediction and response to changes in trade policies. Research shows that the tariff measures imposed by Europe and the United States on Chinese NEVs have triggered a trend of global supply chain restructuring. Chinese enterprises need to avoid policy risks in a single market through diversified market layout [62, p. 57]. Specific suggestions include: while consolidating traditional markets such as Europe and Southeast Asia,

actively expand emerging markets such as the Middle East (e.g., UAE, Saudi Arabia), Latin America (e.g., Brazil, Mexico), and Africa (e.g., South Africa, Morocco) to form a global market network. A comprehensive analysis of the current situation, problems, countermeasures and development trends of China's new energy vehicles indicates that market diversification is an effective strategy to mitigate trade policy risks. Enterprises should consolidate their traditional markets while actively exploring new markets to reduce their reliance on a single market [58, p. 50].

In conclusion, the optimization of overseas market expansion strategies for Chinese new energy vehicle enterprises is a systematic project, which requires the coordinated advancement of three dimensions: international standard management, green supply chain construction, and differentiated market strategies. Driven by technological innovation, Chinese enterprises should accelerate their transformation from «product export» to «standard export» and «brand export», and establish sustainable competitive advantages in the global automotive industry transformation by building a green, compliant and resilient international operation system.

Conclusion

In the era of profound changes in the global energy structure and the accelerated advancement of carbon neutrality goals, the NEV industry has emerged as a strategically critical sector in the global economy. China's NEV industry, through continuous technological innovation, a complete supply chain system, and acute market insight, has become an indispensable force leading the transformation of the global automotive industry.

This article, with a broad perspective rooted in multiple research fields, has conducted an in– depth analysis of China's NEV overseas expansion strategies. On one hand, it has traced the evolution of China's NEV industry from policy cultivation, technological accumulation to large– scale development in the domestic market, systematically sorting out the industrial logic, technological breakthrough paths, and changes in consumer demands. On the other hand, it has maintained a keen focus on the international trade environment and geopolitical landscape, accurately capturing the policy barriers, demand dynamics, and competitive landscapes of major target markets such as Europe, the United States, and Southeast Asia, and deeply analyzing how these external factors shape and constrain the globalization process of China's NEVs.

The theoretical contribution of this paper lies in the construction of a three– dimensional constraint analysis framework of «external policy risk enterprise adaptability supply chain internationalization shortcomings», which systematically integrates the relatively scattered restrictive factors in previous studies and enhances the comprehensiveness and depth of problem diagnosis. In practical terms, green supply chain construction and international compliance capability improvement are regarded as independent strategic modules, and the «green brand international communication path» is proposed, providing an operational strategic reference for the transformation of China's NEVs from «product export» to «standard export» and «brand export».

When discussing the influence of China's NEV market expansion in overseas markets, this paper balances advantages and disadvantages. On one hand, the inherent low– carbon and intelligent attributes of NEVs break through geographical barriers,

enabling advanced Chinese– made products to reach vast overseas consumer markets. Massive overseas operation data feeds back to enterprises for R&D and innovation, giving rise to new manufacturing models such as personalized customization and flexible production, promoting industrial upgrading and transformation. Millions of overseas after– sales service, charging facility maintenance, and international logistics jobs have been created, alleviating social employment pressure. Diverse product choices stimulate the purchasing potential of overseas consumers and become a key engine for stimulating external demand. On the other hand, the rapid expansion of China's NEV overseas market also exposes data security risks, intensified competition among small and medium– sized enterprises, and problems such as false promotion in some markets, sounding an alarm for the sustainable development of the industry.

Moreover, the overseas expansion of China's NEVs is like a powerful engine, continuously providing energy for the optimization and upgrading of China's economic structure. On one hand, it forces manufacturing enterprises to deeply reflect on traditional production models, relying on massive overseas consumption data to accurately understand market demands, gradually shifting from large– scale production to personalized customization and flexible production, promoting the transformation of «Made in China» to «Created in China». On the other hand, it stimulates the innovation vitality of the entire society, giving rise to a series of new business forms such as battery recycling loops, battery swapping models, and overseas live– streaming sales, spreading innovation vitality throughout the economic field.

A systematic analysis of the current situation, problems and development strategies of China's export trade of new energy vehicles reveals that the three– dimensional constraint framework and optimization path identified in this study are highly consistent with current industrial practices, verifying the effectiveness of the analysis framework. The discussion on key issues and countermeasures for the international development of China's new energy vehicle industry provides important theoretical references for this research, especially reaching consensus on three dimensions: standard internationalization, supply chain collaboration, and brand building. The research from the perspectives of supply chain resilience, external shocks, and China– ASEAN cooperation in the new energy

vehicle industry further confirm the discussion in this study on the regional cooperation strategy, indicating that the deep integration of regional value chains is an important support for the globalization of China's new energy vehicles.

In conclusion, this rigorous and in– depth research indicates that the vigorous development of China's NEVs in overseas markets is not a superficial change in business forms, but a profound and comprehensive economic transformation with far– reaching significance. It is like a «universal key», continuously exerting force in multiple key areas such as unlocking economic transformation, honing economic efficiency, igniting innovation vitality, and expanding the boundaries of consumption.

Looking ahead, the overseas expansion of China's new energy vehicle industry will enter a «deep– water zone». On one hand, trade protectionism may further escalate – apart from Europe and the United States, more developing countries may follow the policy combination of «tariffs + localization». On the other hand, the process of global supply chain reconfiguration is accelerating. The competition for key mineral resources, the spread of carbon border adjustment mechanisms, and the refinement of data sovereignty rules will all profoundly affect the internationalization paths of Chinese automakers. Against this backdrop, a single– dimensional «cost– performance advantage» is no longer sufficient to support sustainable international competitiveness. Chinese enterprises must achieve coordinated breakthroughs in three strategic dimensions: technical standard discourse power, green supply chain control power, and brand emotional recognition. Only in this way can China's new energy vehicles truly achieve the three– level leap from «going out» to «entering in» and then to «rising up», and occupy the appropriate strategic position in the reshaping of the global automotive industry landscape.

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