

# Exploring the Development Mechanism of New Energy Vehicle Enterprises under ESG Risk Assessment System: A Longitudinal Analysis of BYD Group

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**Abstract:** New energy is an important part of the energy supply system. In recent years, as the scale of global new energy development and utilization continues to expand, the application of the cost of a rapid decline in wind power, photovoltaic, electric vehicles and hydrogen energy as the representative of the new energy industry has become the world's energy map of the most popular areas of competition, the development and utilization of new energy has become a major developed countries to promote the core content of the energy transition and to address climate change is the main way. China's new energy automobile industry after years of development, the level of technology is rapidly improving, the industrial chain is becoming more and more perfect, and has considerable competitiveness in the global market. However, in this process, enterprises will inevitably be subject to problems and risks from industrial policy, technology development, market scale and company organization. From the perspective of strategic risk management, this paper will analyze the strategic risk management tools and mechanisms of new energy automobile enterprises represented by BYD Group at different stages of development based on ESG risk assessment tools, with a view to obtaining the influencing factors to promote the rapid development of related industries, and to help the enterprises grasp the key points of strategic risk management at different periods, so as to help the industry develop in a healthy way.

**Keywords:** ESG Risk Assessment System, Development Mechanism, Case analysis.

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## 1. Introduction

Since China put forward the strategic goal of "striving to achieve carbon peak by 2030 and carbon neutrality by 2060", the development of new energy vehicles has become an important path to realize the "dual-carbon" goal. The Central Committee of the Communist Party of China (CPC) has introduced comprehensive measures to reduce carbon emissions in its Fourteenth Five-Year Plan for National Economic and Social Development and Vision for 2035. In terms of transportation, the specific performance of a series of measures such as "accelerating the construction of low-carbon transportation system, optimizing the structure of transportation, and promoting energy-saving and low-carbon transportation means". The most closely related to our daily life is to advocate green low-carbon travel, new energy vehicles are an important step [1]. The General Office of the State Council in October 2020 issued a new energy automobile industry development plan (2021-2035) [2], which pointed out that "the development of new energy vehicles is China's automobile power from a large country to the automobile power of the road, is to address climate change, and to promote the green development of the strategic initiatives ". China's new energy automobile industry has made great achievements in the past few years, but the problems of weak core technology innovation ability, weak quality assurance system and lagging infrastructure construction still exist.

This paper will start from the perspective of strategic risk management, based on ESG risk assessment tools to analyze

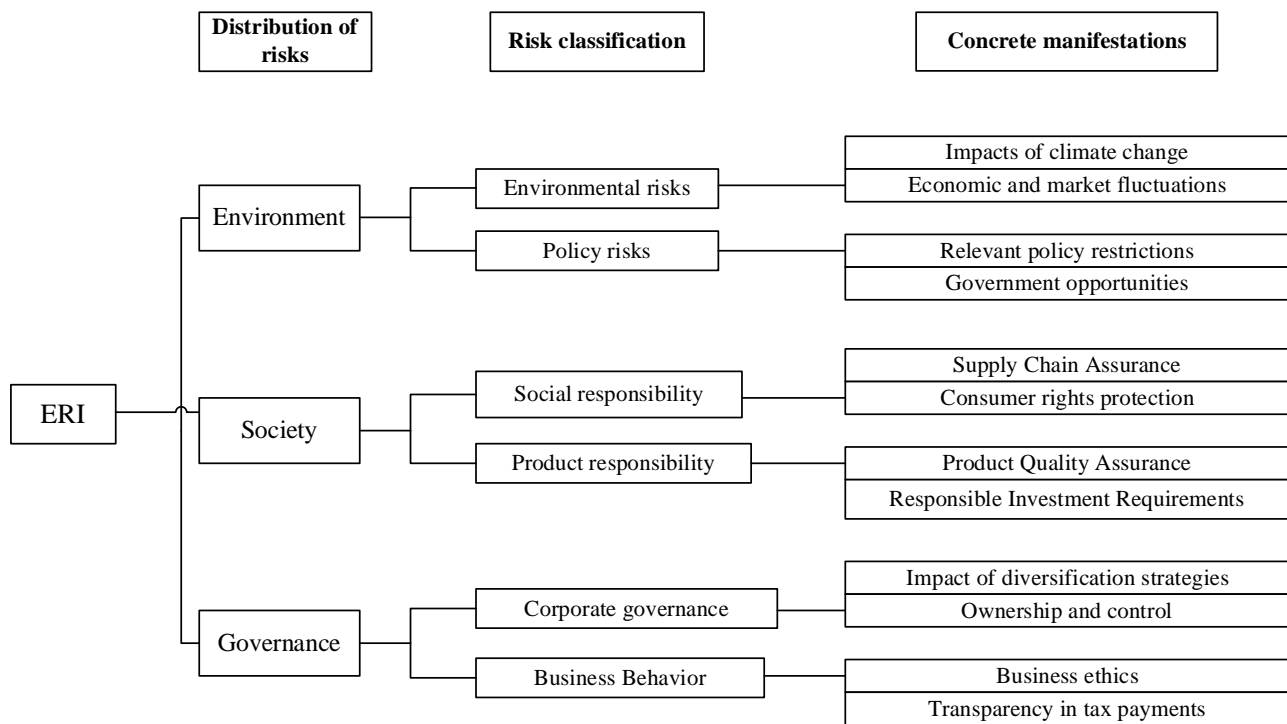
and analyze the strategic risk management mechanism of new energy automobile enterprises represented by BYD Group at different stages of development, in order to get the influencing factors to promote the rapid development of related industries, to help the enterprises to grasp the key points of strategic risk management in different periods, and to help the industry develop healthily.

## 2. ESG-based Strategic Risk Assessment System

Changes in the internal and external environments of a company bring about uncertainty, which also triggers the company's business risks. analyzing and responding to the factors that may cause risks in the dynamic development of the internal and external environments in order to eliminate the uncertainty is the starting point of strategic risk research. The ESG assessment system is a sustainability assessment tool that mainly covers the three dimensions of environmental responsibility, social responsibility and corporate governance. It puts enterprises in the interconnected social system and can effectively identify potential risks, and has been widely used in the field of enterprise management assessment.

### 2.1. Enterprise Risk Identification

According to the "Environmental, Social and Governance (ESG) Blue Book (2022) of Listed Companies of Central Enterprises" [3], combined with the macro policy and the development status of the new energy equipment manufacturing industry, the list of enterprise risks is obtained as shown in the figure below.



**Figure 1.** Categorization of ERI

Firstly, at the environmental level, corporate sustainability risks are categorized into environmental risks and policy risks based on the natural and social environment. Environmental risk is manifested in climate change and industry economic market fluctuations, while policy risk is mainly related to the government's behavioral decisions. Global warming concerns the future survival and development of all mankind, so the consideration of climate change risk is of great significance; at the same time, the impact of emergencies on the economic market is also a factor that must be considered. In addition, for the new energy automobile industry, when the government introduced a series of policies to restrict the production and manufacturing of traditional oil vehicles, it also created policy dividends and opportunities for promoting the new energy automobile industry, so the policy risk is manifested in the relevant policy constraints and government control.

Secondly, governments, enterprises and the public in economies around the world are increasingly concerned about enterprises' commitment to their social responsibility. In this dimension, the risks faced by enterprises mainly come from social responsibility and product responsibility, of which social responsibility includes the protection of the supply chain and consumer rights and interests, while product responsibility requires enterprises to safeguard the quality of their products and take corresponding responsibility for investment demand.

Finally, governance, as an important part of a company's efforts to realize its business objectives, is designed to benefit all shareholders, employees, users, and even internal and external stakeholders, so that the company can achieve long-term sustainable development. At the governance level, this

paper divides the risk into two major aspects: corporate governance and corporate behavior, the former being the organizational structure aspect and the latter being some specific behaviors of the enterprise, specifically the four specific indicators of the impact of diversification strategy, the ownership and control of the enterprise, the fulfillment of business ethics as well as the compliance operation.

## 2.2. Risk Evaluation

The risk assessment framework in this paper is based mainly on the categorization of the risk list, and identifies the existing risks at the indicator level in conjunction with the corporate annual reports and social responsibility reports of new energy vehicle enterprises. The evaluation is carried out by accurately identifying and describing the risks. The principle of risk evaluation in this paper is to consider its relevance to the realization of the strategic objectives of the case enterprise, and a risk is considered relevant if a specific risk may affect the realization of the enterprise's strategic objectives. In addition, when determining the specific risk assessment indicators, it is necessary to fully consider the development of the enterprise and the risk appetite of the management, so as to select appropriate ESG-related risk indicators, determine the priority list of risks and the severity of the risk, and take responsive risk response measures in response to the final assessment results. At the same time, it should also implement dynamic management in the process of risk response to continuously optimize the strategic risk management measures and achieve sustainable development of the enterprise.

**Table 1.** Strategic Risk Assessment System for New Energy Vehicle Enterprises

Target	Distribution of enterprise risks	Risk categorization	Criteria	Mark
Strategic Risk Assessment System (SRAS)	Environment	Environmental risks	Impacts of climate change	Waste management, greenhouse gas emissions management, etc.
			Economic and market fluctuations	Dual-carbon strategies, shocks from sudden major social events
		Policy risks	Relevant policy restrictions	Regulatory policies such as the 14th Five-Year Plan for Green Industrial Development
			Government Controls	Number of corporate violation penalties
	Society	Social responsibility	Supply Chain Assurance	Supply Chain Management, Employee Nurturing and Development
			Consumer rights protection	Consumer satisfaction, customer care levels
		Product responsibility	Product Quality Assurance	Product quality management, R&D quality management, after-sales service assurance
			Responsible Investment Requirements	Green Operations, Green Product Innovation
	Governance	Corporate governance	Diversification strategies	Expanding business scope and optimizing resource allocation
			Ownership and control	Organizational structure of the company and decision-making mechanism
		Business Behavior	Business ethics	Anti-unfair competition, elimination of any form of corruption
			Compliance with regulations	Establishment of codes of conduct and promotion of a culture of integrity in accordance with the law

### 2.3. Risk Management

Under the premise of ensuring the comprehensiveness of risk identification, we can first compare the relevant indicators of the target company with the industry average based on the risk assessment system, determine the ESG risk score of the company through the comprehensive score of multiple indicators, and rank the risk according to the severity level of "Acceptable-Low-Medium-Higher-Serious" to determine the priority of risk control. The ESG risk scores are ranked according to the severity level of "acceptable-low-moderate-high-severe" to determine the priority of risk control. Next, based on management's risk appetite and corporate risk tolerance, it weighs the costs and benefits of risk response, implements specific risk response measures, allocates resources and deploys risk response measures based on the severity and priority of the risks, as well as the comprehensive consideration of the business environment and business objectives. Specifically, management may choose to assume, avoid, or transfer risks for risk control.

## 3. Strategic Risk Management in New Energy Vehicle Enterprises: The Case of BYD

Tesla's "catfish effect" stimulates the innovation vitality of domestic new energy automobile enterprises, which makes domestic new energy automobile enterprises accelerate technology upgrading, improve product quality, and promote the rapid development of the industry. 2021, the sales of new energy automobiles ushered in explosive growth, and China entered into the era of new energy automobiles, with BYD leading the way in sales among the automobile enterprises. BYD has become a leading company in the field of new energy vehicles, with its sales volume far ahead, and its adherence to "innovation-based" BYD has mastered the core technology and launched important products such as blade batteries and DM-i/p hybrid technology, making it a leading company with a great deal of discourse power. However, in

the process of new energy automobile industry development, there will be many risks such as policy dependence, market competition, industrial chain imperfection, etc. Next, we take BYD as an example, analyze the strategies and means to cope with the risks based on its development history, and finally get the process model of new energy automobile industry strategic risk management for leapfrog development based on the new energy automobile enterprise strategic risk assessment system proposed above.

### 3.1. BYD Electric Vehicle Electrification History [4]

#### 3.1.1. Initial construction stage (1995-2008)

BYD started its business in 1995 by manufacturing batteries. In 2002, BYD became the world's second largest rechargeable battery manufacturer, and in the same year set up BYD Auto, formally entered the automobile manufacturing industry, and gradually expand the automobile business, to carry out research and development in the field of batteries, electronic control and so on. BYD's involvement in the automotive business was initially intended to produce electric vehicles, but because the new energy vehicles were still in the nascent stage, so BYD launched models basically to fuel vehicles, launched in 2005 BYD F3, with its cheap and highly equipped features, sought after by the market, while coinciding with the rapid growth of China's automotive industry, the scale of BYD's fuel car production and sales to grow rapidly. However, BYD never forgets its original intention and always insists that energy saving and emission reduction is the long-term trend of the global automobile industry. In 2008, BYD released China's first hybrid car of its own brand: BYD F3DM.

At this stage, BYD not only laid the foundation for the battery production and manufacturing technology, but also rode on the dividends of market growth when it ventured into the field of automobile production to seize part of the automobile market. However, overall, due to the market environment, technological barriers, and limitations on production scale, combined with the strategic risk assessment

system, the important risk identified was product quality assurance in product liability. This period of electrification development process can be summarized as "integrated planning".

### **3.1.2. Scale expansion stage (2009-2012)**

BYD accelerated the speed of manufacturing and sales in this phase, and launched a number of new models. But at the same time, the domestic auto sales growth slowed down, and gradually entered the stock game brief, in addition to a large number of joint venture car enterprises, the price down, further compression of the development of the small independent brand is still weak space, BYD in the first round of fuel car development after the high in 2010 into the platform period, and even in 2011 there was a decline in sales. BYD began to rethink the direction of development, to regain the original intention, to increase investment in new energy vehicles R & D and production efforts. As the public transportation sector is driven by policies, government subsidies and support, BYD's collection of pure electric bus K9 was put into trial operation as a bus in Shenzhen in 2011, and later promoted the operation of K9 in Changsha, Xi'an and other places for public transportation. In addition, in 2012, BYD successfully developed the world's leading dual-mode second generation technology and bi-directional inverter technology, further consolidating its technological leadership in the field of new energy vehicles.

Based on the strategic risk assessment system, the main strategic risks identified in this period were consumer rights in social responsibility and diversification strategy in corporate governance. The development process of BYD's electrification in this period is summarized as "Consolidation and Rooting". 2009 to 2012 was a period when the government strongly supported and encouraged the emerging industry of new energy vehicles. Firstly, BYD realized the pilot operation of electric cabs and electric buses in municipal public transportation and gradually promoted them, which effectively pushed forward the electrification process of the enterprise.

### **3.1.3. In-depth development stage (2013-present)**

The private transportation sector has higher requirements for new energy vehicles in terms of range, speed and price. After achieving a certain degree of success in the field of public transportation, BYD's new energy vehicles have gradually transformed into the field of private transportation. 2013, BYD launched the dual-mode electric vehicle "BYD Qin" for individual consumers, which quickly became the champion of China's new energy vehicle sales. In 2013, BYD launched the dual-mode electric vehicle "BYD Qin" for individual consumers, which quickly became the top-selling new energy vehicle in China, followed by the "Qin", "Tang" and other new energy vehicles in the "Dynasty Family" series, all of which have achieved high market response and market share. As a result, BYD further consolidated its leading position in the new energy vehicle market at this stage, and continued to increase R&D investment in the fields of batteries, motors, and electronic control, and researched and developed its own turbocharged engine + dual-clutch transmission technology, DM hybrid technology, and pure-electricity technology, etc., and launched the "BYD e Platform", which has undergone three iterations, gradually realizing the "BYD e Platform", which is the first of its kind in China. Since 2018, while continuously consolidating its leading position in the field of electrification, BYD is also accelerating the process of automobile intelligence: in the

field of AI chips, BYD invested in the chip company Horizon; LIDAR is the most advanced technology in the world. In the field of AI chips, BYD invested in chip company Horizon; in the field of LIDAR, BYD and LIDAR manufacturer RoboSense announced a strategic investment agreement and a strategic cooperation framework agreement; in the field of automatic driving algorithms, BYD and Momenta, an automatic driving startup company, established a joint venture called "Shenzhen Dipai Zhixing Technology Co. Ltd. to create future-oriented high-level intelligent driving solutions; in addition, BYD and Baidu reached a cooperation agreement, Baidu became BYD's intelligent driving technology supplier, providing BYD with mass-production ANP intelligent driving products and human-machine co-driving maps and other technical support.

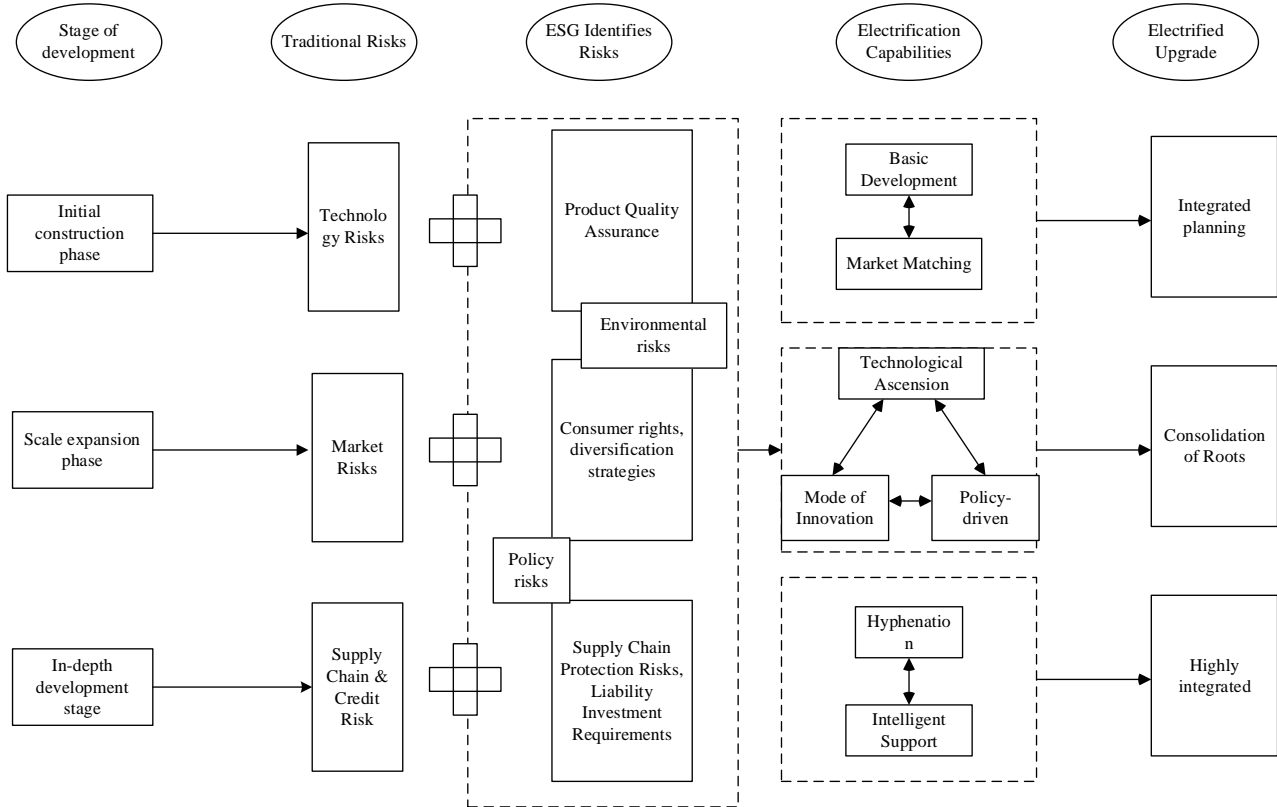
The main risks faced by BYD in this period under the strategic risk assessment system of new energy automobile enterprises include supply chain security in social responsibility and the demand for responsible investment in product responsibility. In particular, the environmental and policy risks, though always present, are particularly prominent in this stage. Highly integrated and intelligent development became the main feature of this phase. In this stage, especially since 2018, BYD's electrification technology has soared and exploded, and its hybrid technology has been upgraded for many iterations, from the introduction of the third-generation hybrid technology with a high-power electric motor in 2018 to the DM-p hybrid system that inherits the second- and third-generation hybrid program of "triple electric motor + dual-clutch transmission" in 2020, and in addition, there are also the hybrid systems that focus on low-cost and low-fuel consumption. There is also the DM-i dual-motor hybrid technology, which focuses on low cost and low fuel consumption; in terms of batteries, BYD began to expand battery production capacity in 2014, and gradually eased the bottleneck of battery production capacity in 2018, and in 2020, it launched the blade battery, which effectively improves the battery performance and safety; in terms of electric drive, BYD actively promotes the development of electric drive integration, and in 2021, it will release the "e Platform 3.0", which will be the first generation of hybrid technology in China. In terms of electric drive, BYD actively promotes the development of electric drive integration, and the "e platform 3.0" released in 2021 carries an eight-in-one electric drive assembly on the basis of the previous two generations of platforms, realizing the platformization of the whole vehicle architecture; in terms of power supply piles, BYD has developed a circulating three-dimensional charger with intensive land use, and has realized the integration of the whole industrial chain from the batteries to the electric drive system to the charging piles to cope with the risk of the supply chain, and its cooperation with a number of science and technology companies has also strengthened the development of BYD. The cooperation with many technology companies has also strengthened the intelligent support of BYD's new energy vehicles. In addition, in order to cope with the demand for responsible investment, BYD actively advocates the promotion of green development, strengthens energy management, optimizes the production process, increases energy-saving transformation, and promotes green manufacturing.

### 3.2. New Energy Vehicle Industry Strategic Risk Management Electrification Development Process Model

Based on the analysis of the case enterprise in three

development periods, the summary obtains its strategic risk management electrification development process model, as shown in the following figure.

**Table 2.** New Energy Vehicle Industry Strategic Risk Management Electrification Development Process Model



Specifically, BYD's three different capabilities for electrification development in three periods: "technology leadership", "industry chain coordination" and "intelligent network connection" are undergoing continuous dynamic changes; at the same time, the traditional risks faced by the company and the risks identified by the ESG system also change with the development stage. At the same time, the traditional risks faced by enterprises and the risks identified by the ESG system also change with the development stages. In the process of electrification development, BYD improves its risk response ability through its own risk identification and specific response means: such as supply chain security, product quality and environmental risks have been successfully converted into opportunities, which promotes the upgrading of the enterprise, and enables BYD to realize the upgrading development from integrated planning to consolidated rootedness to highly integrated development.

### 4. Summary

Based on BYD's development history, this paper formulates a whole set of risk management process model for BYD, from risk identification to monitoring and improvement. Under the double pressure of traditional risk and ESG system risk, BYD firmly grasps the initiative of development, through the continuous development of electrification technology, at the same time integrating the industrial chain, carrying out multi-faceted layout, and actively cooperating with other enterprises, to complete the

enterprise's stage-by-stage leaping development, and finally become an industry leader.

The future of the automotive industry began to move towards the "new four", that is, electrification, intelligence, network connectivity, sharing, and for China, the new energy vehicle field and parts production has a complete industrial chain advantage, a large number of excellent new energy vehicle enterprises will be fully competitive in the international market. However, the future industrial policy may lead to new energy vehicle industry risks, such as the risk of inefficiency caused by industrial isomorphism, the risk of market demand caused by the government subsidy regression, the risk of short-term decision-making by the local government caused by the government out of multiple doors, etc. [5], coupled with the traditional risks of the technology and the market, as well as the risks identified under the ESG system, the relevant enterprises in the industry should strengthen the risk management awareness, and make decisions while clarifying the development stage of the enterprise. At the same time to make a clear enterprise development stage at the same time to match the risk response means, to cultivate with the current stage of electrification and intelligent development capabilities, to achieve the healthy development of enterprises and even the entire new energy automobile industry.

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