

Research on Corporate Green Investment Performance: A Case Study of Tesla

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ABSTRACT

Under the constraints of global "Carbon Peak and Carbon Neutrality" goals, corporate green investment has become the core carrier connecting environmental responsibility and sustainable development. This paper takes Tesla as a case study to explore the performance evaluation system, influencing factors, and mechanisms of corporate green investment. The research employs case study method and financial ratio analysis, combined with the sustainable development theoretical framework. The findings indicate that Tesla's green investment exhibits a "U-shaped" nonlinear relationship, facing short-term cost pressures but achieving performance recovery in the long term through technological innovation dividends and brand premiums. This study provides empirical support for enterprises to balance short-term financial pressure with long-term strategic value.

KEYWORDS

Green investment; Corporate performance; Tesla; U-shaped relationship; Sustainable development

1 Introduction

Under the rigid constraints of global "Carbon Peak and Carbon Neutrality" goals and the widespread adoption of green development concepts, industrial green transformation has become an irreversible global trend. As the core carrier connecting environmental responsibility and sustainable development, the scale and quality of corporate green investment directly determine long-term corporate competitiveness. Tesla, as a benchmark enterprise in the new energy industry, has built a full-chain green industrial layout covering electric vehicle R&D and manufacturing, energy storage system deployment, and renewable energy utilization through vertical integration strategy. Its green investment runs through the entire process of technology R&D, production manufacturing, infrastructure construction, and operational services, forming a replicable and scalable green development model.

From the perspective of practical effectiveness, Tesla's green investment has shown characteristics of large-scale implementation: as of 2024, the number of global Superchargers has exceeded 67,000, with 11,500 new additions throughout the year, representing a year-on-year growth of 19%, building the world's densest electric vehicle charging network; the Shanghai Gigafactory has accumulated production of 3 million vehicles, with one-third of "Made in China" Teslas exported to Asia-Pacific and European markets, becoming a core base for global green vehicle production and export; in October 2024, the number of global vehicle owners exceeded 7 million, with continuously expanding market coverage. However, the "high investment, long cycle, high uncertainty" characteristics of green investment have led to complex contradictions in its performance: in 2024, Tesla's net profit decreased by 53% year-on-year, with continuously declining automotive business gross margins, facing significant short-term cost pressures and profitability challenges; but at the same time, its free cash flow remained stable at \$3.6 billion, with cash and investments increasing to \$36.6 billion (an increase of \$7.5 billion year-on-year), demonstrating strong financial resilience, and with accelerated energy storage business deployment and deep integration of artificial intelligence technology with green business, it has built insurmountable technological barriers and industrial synergy advantages.

Existing research has confirmed that the relationship between green investment and corporate performance is not simply linear, but may exhibit a "U-shaped" nonlinear relationship—short-term performance pressure due to green investment crowding out production and operating funds, and technology transformation not meeting expectations, while long-term performance recovery and sustainable growth are achieved through technological innovation dividends, brand premiums, and market share expansion. However, current research has not yet clarified: how do cross-domain green investments (automotive + energy storage + renewable energy) of multinational technology companies affect the formation and inflection point characteristics of the "U-shaped" relationship? How should enterprises balance short-term financial pressure with long-term strategic value to achieve win-win outcomes for environmental and economic benefits? As a typical sample with large-scale green investment practice, significant performance contradictions, and cross-domain layout characteristics, Tesla's decision-making logic, implementation path, and performance evolution patterns of green investment are precisely the key to solving the above research gaps. Based on this, this study takes Tesla as a case to systematically explore the performance evaluation system, influencing factors, and mechanisms of green investment, providing empirical support for answering the core question of "how green investment can achieve short-term cost control and long-term value enhancement."

2 Literature Review

2.1 Research on Corporate Green Investment

2.1.1 Definition and Connotation of Green Investment

Foreign scholars' definitions of green investment focus on the combination of "environmental improvement goals" and "investment behavior attributes": Porter & van der Linde (1995) proposed that green investment refers to capital investment activities such as technology R&D, equipment upgrading, and facility construction that enterprises undertake to reduce environmental pollution in production and operations and improve resource utilization efficiency. Its core is to achieve win-win outcomes for environmental compliance and competitiveness enhancement through investment. Hart (1995) further expanded in the natural-resource-based view, arguing that green investment is a strategic behavior for enterprises to build environmental resource advantages, including not only end-of-pipe treatment investments but also preventive investments such as source emission reduction and clean production.

Domestic research emphasizes the synergy between green investment and national policies and institutional environments: Chen Xun et al. (2005) pointed out that Chinese enterprises' green investment is an investment behavior transitioning from passive compliance to active strategy under the dual drive of environmental regulation and market demand, possessing both environmental responsibility and economic rationality. Wen Subin et al. (2017), combining the "Two Mountains Theory," defined green investment as investment activities covering multiple dimensions such as green technology R&D, green supply chain construction, and green infrastructure layout, with the goal of achieving synergy among ecological value, economic value, and social value.

2.1.2 Industry Heterogeneity Characteristics of Green Investment

Existing research has generally confirmed the significant industry heterogeneity of green investment: green investment in high-energy-consuming industries (such as steel and chemicals) focuses on end-of-pipe treatment and energy-saving transformation, with investment intensity positively correlated with environmental regulation intensity (Wang Banban et al., 2019); while green investment in the new energy industry focuses on technological innovation, industrial chain integration, and infrastructure construction, characterized by large investment scale, rapid technology iteration, and significant synergy effects (Zhang Cheng et al., 2021). As a leading enterprise in the new energy industry, Tesla's green investment has formed a full-chain layout of "technology R&D - production manufacturing - infrastructure - operational services," with practices such as over 67,000 global Superchargers and 3 million cumulative production at the Shanghai Gigafactory being typical manifestations of the high-intensity, large-scale characteristics of green investment in the new energy industry (Li Meng et al., 2023).

2.2 Research on Green Investment Performance

2.2.1 Controversies over the Relationship between Green Investment and Corporate Performance

The academic community has not yet reached a unified conclusion on the relationship between green investment and corporate performance, with three main perspectives: the positive correlation theory holds that green investment can bring long-term economic benefits to enterprises through paths such as enhancing brand image, reducing compliance risks, and optimizing resource allocation (Orlitzky et al., 2003); the negative correlation theory argues that green investment will crowd out production and operating funds, and with characteristics such as high investment, long payback period, and strong asset specificity, will reduce corporate profitability in the short term (Friedman, 1970); the nonlinear relationship theory has received more support in recent years, with Crifo et al. (2015) proposing that green investment and corporate performance exhibit a "U-shaped" relationship, where as green technology accumulates and market share expands, the marginal benefits of green investment will gradually exceed marginal costs, achieving performance reversal.

2.2.2 Evaluation Dimensions of Green Investment Performance

Existing research on the evaluation of green investment performance shows divergence between "single dimension" and "multi-dimensional" approaches: early research mostly focused on financial performance, selecting financial indicators such as return on assets (ROA), return on equity (ROE), and gross margin for evaluation (Margolis et al., 2009); in recent years, with the deepening of sustainable development concepts, multi-dimensional evaluation systems have gradually formed. Elkington's (1997) "Triple Bottom Line" theory provides an important framework for performance evaluation, namely evaluation from three dimensions: economic, environmental, and social. Domestic scholars Gao Chenchen et al. (2022) built upon this to construct a green investment performance evaluation system encompassing financial benefits, environmental benefits, and strategic value.

2.3 Literature Review Summary

Comprehensive review of existing literature shows that the academic community has conducted considerable research on the definition, industry characteristics, and performance relationships of green investment, providing a solid theoretical foundation for this paper. However, there are still three areas of deficiency: first, the green investment

performance evaluation system needs improvement, with existing research either focusing on single financial indicators while neglecting the evaluation of environmental benefits and strategic value; second, research on the "U-shaped" relationship between green investment and corporate performance has limitations, with existing empirical research mostly based on industry panel data and insufficient dynamic case analysis of single enterprises; third, there is insufficient systematic research on Tesla's green investment, with existing research mostly focusing on single dimensions and lacking overall identification, classification, and performance evaluation of its green investment portfolio.

3 Identification and Classification of Tesla's Green Investment

Based on Tesla's annual reports, financial statements, and project disclosure documents, combined with the definition of green investment and new energy industry characteristics, this paper classifies its green investment projects into the following three categories:

3.1 Electric Vehicle R&D Investment

R&D investment is the core source of green investment, directly determining the technological competitiveness and environmental benefits of green products. Tesla's core product is electric vehicles, and its R&D investment in battery energy density improvement and autonomous driving energy-saving algorithm optimization directly reduces product energy consumption and carbon emissions, serving as the core technical support for achieving "carbon reduction" goals; at the same time, this type of investment belongs to preventive green investment, consistent with the "technology innovation-driven" green development logic of the new energy industry, fundamentally different from end-of-pipe treatment investment.

3.2 Green Production Facility Construction Investment

Production facilities are the key carriers for large-scale implementation of green products, and their green level directly affects the carbon footprint of the entire industrial chain. Tesla's Shanghai Gigafactory and energy storage Gigafactory both use renewable energy power supply, energy-saving production processes, and circular economy models (such as waste recycling), representing typical green production facilities; this type of investment reflects the "full-chain greening" layout characteristics of new energy enterprises, ensuring both the production scale of green products (such as 3 million cumulative production at Shanghai Gigafactory) and reducing environmental impact in the production process, serving as the core link connecting R&D and market.

3.3 Green Infrastructure Layout Investment

Green infrastructure is the basic guarantee for commercial promotion of green products, and its coverage and service capabilities directly affect market acceptance. Tesla's global Supercharger network solves electric vehicle users' "range anxiety," while renewable energy generation facilities (such as Solar Roof) provide clean energy for production and charging networks, with the two types of investment forming a "product + service + energy" synergy loop; this type of investment has large-scale, networked characteristics, representing an important distinction between green investment in the new energy industry and traditional industries.

4 Multi-dimensional Performance Evaluation of Green Investment

4.1 Financial Performance

Indicators such as return on assets (ROA), gross margin of green business, and green operating cash flow are selected, combined with 2024 financial data (net profit decreased by 53% year-on-year, free cash flow of \$3.6 billion, cash and investments of \$36.6 billion), to analyze short-term cost pressures and long-term profit growth potential. Tesla's 2024 net profit decline reflects the cost pressure of green investment in the short term, but stable free cash flow and ample cash reserves provide a solid foundation for long-term strategic investment.

4.2 Environmental Performance

Indicators such as carbon reduction per unit product, total carbon reduction, energy intensity, and renewable energy utilization rate are used to reflect the environmental benefits of green investment. Tesla's Shanghai Gigafactory uses renewable energy power supply, and energy storage business installed capacity continues to grow, making positive contributions to global carbon reduction.

4.3 Strategic Performance

Evaluation is conducted from three aspects: global market share of new energy vehicles (over 7 million global vehicle owners), construction of technological barriers (number of green patents), and effectiveness of energy storage industry layout (supporting global Supercharger network operations). Tesla has built insurmountable technological barriers and industrial synergy advantages, with the Supercharger network's year-on-year growth of 19% demonstrating the strategic value of its infrastructure layout.

5 Analysis of Factors Influencing Green Investment Performance

5.1 Internal Factors

Internal factors include technological innovation capability, cost control level, and cash flow status. Tesla's continuous technological innovation is the core driving force of its green investment performance, with 2024 free cash flow of \$3.6 billion providing financial security for green investment.

5.2 External Factors

External factors include environmental regulation, market competition intensity, and carbon trading market mechanisms. Global "Carbon Peak and Carbon Neutrality" goals provide a favorable policy environment for new energy enterprises such as Tesla, and the development of carbon trading markets also brings new revenue sources for enterprises.

5.3 U-shaped Relationship Verification and Inflection Point Characteristics Analysis

The focus is on verifying whether there is a "U-shaped" relationship between green investment intensity and financial performance, combined with the contradictory data of 2024 net profit decreasing by 53% and continuous expansion of green infrastructure scale, to analyze inflection point characteristics and formation mechanisms. Tesla's practice confirms the reality of the "U-shaped" relationship: short-term cost pressure from declining net profit, but in the long term, green investment effectiveness such as 19% year-on-year growth of the Supercharger network, stable production and export from Shanghai Gigafactory, and rapid expansion of energy storage business has gradually transformed into market competitiveness and strategic value.

6 Conclusions and Recommendations

This study takes Tesla as a case to systematically explore the performance evaluation system, influencing factors, and mechanisms of corporate green investment. The findings are: first, Tesla's green investment has formed a full-chain layout of "technology R&D - production manufacturing - infrastructure - operational services"; second, green investment and corporate performance exhibit a "U-shaped" nonlinear relationship, with 2024 net profit declining by 53% reflecting short-term cost pressure, but long-term strategic value such as 19% year-on-year growth of the Supercharger network and stable production at Shanghai Gigafactory gradually becoming apparent; third, technological innovation capability, cash flow status, and environmental regulation are key factors influencing green investment performance.

Research limitations: This study focuses only on the single case of Tesla, and the generalizability of conclusions needs further verification. Future research can expand to more new energy enterprises, conduct cross-case comparative studies, and deeply explore the long-term performance evolution patterns of green investment.

Recommendations for domestic enterprises: first, build high-quality green IP and construct full-chain green industrial layout; second, collaborate with fan communities to cleverly promote green concepts; third, achieve industrial interconnection, develop peripheral products and theme parks, and achieve diversified profit models.

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