

Dimensions and Optimization Strategies of Corporate Green Management Under Policy Drivers

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Abstract:

Under the guidance of the “dual carbon” goals and sustainable development strategies, environmental protection policies (regulations, standards, economic tools, etc.) have become the core external driving force for promoting the green transformation of enterprises. This study focuses on the influence of environmental policies on enterprise green management, concentrating on the action paths and synergistic relationships of three types of policy tools: command-and-control, market-based incentives and voluntary mechanisms. Based on multiple domestic and international literature sources, this research systematically sorts out and comparatively analyzes the role models, driving mechanisms and comprehensive effects of policy tools in the construction of enterprise green management systems. The results show that command-and-control policies lay the basic threshold for enterprises’ green transformation, market-based incentives provide continuous economic incentives, and voluntary mechanisms promote value recognition and collaborative innovation. The three form a complementary and dynamic evolutionary combination, which is conducive to promoting enterprises’ transformation from passive compliance to active innovation. This research holds significant reference value for optimizing policy design, guiding enterprises to integrate the concept of green development into their strategies, and promoting the coordinated development of economy and ecology.

Keywords: Environmental protection policy; green management; command-and-control; market-based incentives; voluntary mechanisms.

1. Introduction

Over the past decade, China has continuously intensified its efforts in the formulation and implementation of environmental protection policies. From strict emission standards to flexible market-based tools, and then to green initiatives that encourage voluntary participation of enterprises, the policy system has been constantly improved and diversified. These policies not only directly affect the production models of industries with high pollution and high energy consumption, but also deeply shape the green management paths of enterprises in multiple fields such as manufacturing and services. Policy-driven constraints and incentives are bringing about systematic changes in enterprises' equipment renewal, technological research and development investment, and supply chain collaboration.

Research centered on policy-driven corporate green management has significant practical significance and academic value. On the one hand, from a practical perspective, policymakers need to understand how different types of environmental protection policies affect the behavioral patterns of enterprises in terms of internal management and external collaboration, thereby enhancing the implementation effect of policies. On the other hand, from the perspective of academic research, it is necessary to explore the matching relationship and mechanism of action between policy tools and enterprise management dimensions. This not only helps to enrich the theoretical framework of green management but also provides a reference for constructing a more efficient policy system.

Existing research has achieved relatively systematic results in terms of policy classification, enterprise green management models, and policy influence mechanisms. Overall, command-and-control policies can rapidly reduce emission levels in high-pollution and high-energy-consuming industries. Through strict emission standards, access restrictions, and law enforcement inspections, they force enterprises to upgrade their equipment and carry out technological renovations. However, they can also easily lead enterprises to remain at the "passive compliance" level, lacking the motivation for continuous green innovation. Market-incentive policies rely on economic tools such as carbon trading, green credit, and tax incentives to guide enterprises to actively carry out green investment through economic benefit signals. They have shown a strong driving force in fields such as new energy and energy-saving manufacturing and have a long-term pulling effect on green R&D investment. Voluntary policies emphasize enterprises' independent participation in green certification, Environmental, Social and Governance (ESG) disclosure and environmental public welfare, which can enhance

environmental awareness and corporate social responsibility, and promote market recognition and investor favor through reputation effects. Research generally finds that enterprises of different industries and sizes show significant differences in policy responses. Large enterprises are more likely to transform policy opportunities into strategic advantages, while small and medium-sized enterprises are often constrained by financial and technological resources and need external support to achieve green upgrades. Furthermore, the intensity of policy effects in dimensions such as green production, green R&D, green operation and green supply chain is not consistent, which suggests a complex interactive relationship between policy tool design and enterprise management dimensions. It also provides a solid theoretical foundation for exploring more precise and efficient policy systems and green management models for enterprises.

This study will comprehensively apply methods such as policy analysis, case study and literature review. Based on typical policy cases and enterprise practice data in China, it will analyze the effect path of environmental protection policies on enterprise green management and explore optimization strategies. The innovation of the research lies in classifying environmental protection policies into three categories: command-and-control policy, market-based policy and voluntary policy, and respectively corresponding them to the two core dimensions of internal and external enterprise green management, constructing a systematic analysis framework of policy types and management dimensions. In addition, the research will take into account the differences in various industries and enterprise scales to put forward policy and enterprise-level optimization suggestions that are both targeted and operational.

The structure of the article is arranged as follows: The second part defines the main types of environmental protection policies and the core dimensions of enterprise green management; the third part analyzes the mechanism of action and influence path of different policy types on enterprise green management; the fourth part puts forward optimization suggestions from both policy and enterprise perspectives; the fifth part summarizes the research conclusions and looks forward to future research directions.

2. Environmental Protection Policy Types and Corporate Green Management Dimensions

2.1 Classification and Characteristics of Environmental Protection Policy

In China's green development strategy, environmental

protection policies can usually be classified into three categories: command-and-control policies, market-based policies and voluntary policies. This classification has been widely adopted and verified in numerous domestic and international studies [1].

Command-and-control policies are based on laws and regulations and regulate enterprise behavior by setting clear emission limits, technical standards and production requirements. Their advantage lies in the direct and quantifiable implementation effect. For instance, the “ultra-low emission transformation” measures implemented in highly polluting industries such as steel and cement can significantly reduce pollutant emissions in a short period of time [2]. However, such policies lack flexibility, and some enterprises may only meet the minimum compliance standards, resulting in a “passive compliance” phenomenon.

Market-based policies refer to promoting the green transformation of enterprises through price signals, economic incentives and trading mechanisms, such as carbon emission trading, pollution discharge rights trading and tax incentives. Research shows that such policies not only promote enterprises to continuously optimize resource utilization efficiency but also encourage them to increase investment in green R&D, thereby forming a long-term competitive advantage. However, their effectiveness depends on the maturity of the market mechanism and the completeness of the regulatory system. If the market is imperfect, price signals may be distorted [3].

Voluntary policies are based on the voluntary participation of enterprises, including green certification (such as ISO 14001), voluntary environmental information disclosure, and industry green alliances. Such policies, through reputation effects, market recognition and the enhancement of investor confidence, encourage enterprises to proactively carry out green production and green operation. Some studies have pointed out that after obtaining green certification, some enterprises not only improve their environmental performance but also achieve product premium and market share growth [4]. However, their promotion effect is restricted by the environmental awareness of enterprises and the market environment of the industry [5]. Overall, the three types of policies each have their own advantages and limitations in promoting green management in enterprises. Their actual effects are often comprehensively influenced by industry characteristics, enterprise scale and the intensity of policy implementation.

2.2 Core Dimensions of Corporate Green Management

The two core dimensions of green management primarily comprise internal management and external collabora-

tion of the enterprise. Furthermore, this dual-dimensional framework has established an all-round green governance system.

Internal management encompasses three key links: green production, green R&D and green operation. Specifically, green production emphasizes introducing advanced clean production processes, efficient energy-saving equipment and precise pollution prevention and control technologies, consequently achieving pollutant reduction and efficient resource utilization from the source. In parallel, green R&D focuses on innovative research and development of environmental protection materials, breakthroughs in emission reduction technologies and innovations in energy efficiency, not only optimizing the environmental performance of enterprises, but also shaping the leading advantage of sustainable technologies. Additionally, green operation achieves the green transformation and deep integration of the entire business operation process by establishing a sound waste recycling mechanism, optimizing the energy structure ratio, and establishing a systematic internal environmental management system.

External collaboration predominantly manifests in two strategic directions: green supply chain and green marketing. Notably, green supply chain necessitates that enterprises formulate strict environmental access standards for suppliers, implement green procurement policies, full-chain traceability of raw materials and dynamic assessment mechanisms for environmental performance of suppliers, hence reducing the ecological footprint of the entire value chain [6]. Correspondingly, green marketing strategically positions product environmental value proposition, through transparent environmental information disclosure, authoritative green label certification, etc., subsequently enhancing consumer trust and investor confidence, and particularly demonstrating significant competitive advantages in a market environment with increasingly enhanced environmental awareness.

Empirical evidence substantiates that internal management and external collaboration constitute a dynamic and mutually reinforcing organic whole. The green technological innovation and management optimization within the enterprise lay a solid foundation for external collaboration, whereas the external supply chain partnerships and market feedback mechanisms in turn drive the continuous iteration of internal management, ultimately forming a green management ecosystem throughout the entire value chain from production, circulation to consumption, significantly enhancing the adaptability and development resilience of enterprises in the process of green transformation [7].

3. Policy Impact Paths on Corporate Green Management

3.1 Command-and-Control Policy Mechanism

In the construction of the enterprise's green management system, command-and-control policies take laws, regulations and mandatory standards as the core and promote the green upgrading of enterprises through external constraint mechanisms. The notable feature of such policies is their rigidity and operability, which can set clear compliance boundaries for enterprises. Mandatory standards are mainly reflected in aspects such as environmental emission limits, pollutant treatment requirements, and green norms for production processes. These requirements not only stipulate the total emission control of enterprises but also detail the equipment operation standards and waste treatment procedures in the production process, thereby reducing the environmental load at the source.

Facing stringent environmental protection standards, enterprises often need to carry out technological transformation. For example, introduce the cleaner production process, update energy-saving and emission-reduction equipment, and configure efficient pollution control facilities to meet regulatory requirements and avoid environmental penalties. Such renovations reduce pollutant emissions, enhance energy utilization efficiency and resource allocation levels, thereby indirectly strengthening the cost control capabilities of enterprises. Strict environmental protection standards have played a significant role in promoting green technology transformation in highly polluting industries and have driven a notable increase in enterprises' investment in energy-saving and emission-reduction equipment [8].

Access restrictions are another important means of command-and-control policies. By setting market access thresholds, enterprises that do not meet green standards are excluded from the market. This mechanism is particularly prominent in high-pollution and high-energy-consuming industries, typically including energy utilization indicators, compliance rates for environmental protection facilities, and green certification requirements, etc. For instance, in industries such as steel, cement, and chemicals, new entrants must complete the layout of green production lines in advance and pass relevant environmental protection inspections before entering the market [9]. This screening mechanism effectively raises the environmental threshold of the industry at the entry stage and reduces the subsequent regulatory pressure.

Overall, the rigid characteristics of command-and-control policies ensure the basic compliance of enterprises' green

management and also lay the institutional foundation for subsequent market-based incentives and voluntary mechanisms.

3.2 Market-Based Policy Impact Mechanism

Market-based incentives link environmental protection goals with economic benefits through means such as price mechanisms, fiscal subsidies, and green credit, consequently inducing enterprises to increase green investment while pursuing maximum profits. Specifically, green financial tools, especially green credit policies, can substantially reduce the capital cost for enterprises to make green investments through means such as low-interest loans, extended repayment periods, and tax breaks [10]. Furthermore, this policy arrangement encourages enterprises to invest in green R&D, simultaneously promoting the procurement of green production equipment and the upgrading of environmental protection facilities.

In practical implementation, financial tools such as green credit and green bonds not only provide direct financial support for enterprises but also introduce an environmental performance assessment mechanism in credit approval, thereby making it necessary for enterprises to simultaneously improve their environmental management level when financing. Notably, this kind of embedded constraint promotes enterprises to form long-term green development strategies.

Carbon emissions trading and pollutant emissions trading systems are also typical market-based incentives. When enterprises reduce carbon emissions per unit of product through technological innovation, the sale of excess emission quotas can bring significant financial returns. These returns, in turn, increase the investment in green research and development, forming a positive cycle of "economic benefits - environmental protection investment" [11].

Additionally, some local governments have introduced policies such as differentiated water, electricity and gas prices and green tax incentives in market-based incentives designs, directly linking environmental performance to the cost of production factors of enterprises. Consequently, this enables enterprises with excellent green performance to gain a sustained advantage in operating costs. In essence, this differentiated incentive promotes green competition while also accelerating the exit of backward production capacity.

3.3 Voluntary Policy Guidance Mechanism

Voluntary mechanisms do not rely on mandatory legal constraints, but rather effectively prompt enterprises to proactively enhance their green management level through soft mechanisms such as reputation, social responsibility

and industry self-discipline. Empirical results indicate that manufacturing enterprises implementing Green Human Resource Management (GHRM) can significantly improve both the quantity and quality of their green innovation outputs, while achieving higher ESG ratings [11].

Information disclosure is an important means of reputation incentives. Specifically, enterprises proactively release environmental, social and governance (ESG) reports or annual green development reports, which can significantly enhance transparency and intensify external supervisory pressure, consequently creating a demonstration effect in the industry. Particularly, in the capital market, environmental information disclosure has become one of the important reference indicators for investment decisions, thereby significantly affecting the financing costs of enterprises and the speed of capital inflow.

The policy platform plays a role in resource aggregation and knowledge dissemination in voluntary mechanisms. In practice, the government or industry associations provide enterprises with opportunities for experience sharing, technical cooperation and market connection through measures such as establishing green industry alliances, organizing technical exchange meetings and providing green technology pilot demonstrations. For instance, the Green Supply Chain collaboration project and the Green Technology Innovation Alliance not only promoted the integration of upstream and downstream resources but also accelerated the industrialization and scale-up process of green technologies.

This voluntary path centered on reputation and cooperation effectively can make up for the deficiencies of command-and-control and market-based incentives, promoting enterprises to continuously optimize the green management system through soft constraints and value recognition. Furthermore, this approach can also enhance the ability of enterprises to embed environmental elements into strategic planning and resource allocation, ultimately forming stable reputation gains and market returns without mandatory penalties [12].

4. Optimization Recommendations

4.1 Policy Level

In green management governance, conducting high-resolution profiling around governance objects, emission structures and technological boundaries is a prerequisite for enhancing policy targeting. For different industry scenarios and enterprise life cycles, regulatory indicators should be hierarchically governed around emission intensity, energy efficiency, and technology readiness,

and process constraints and result performance should be evaluated in a bundled manner. For SMEs, the combination of green finance + digitalization is more cost-benefit efficient: Data is accumulated through methods such as e-invoice, e-procurement, and e-monitoring to reduce information asymmetry and screening costs, enabling green performance to be identified in a timely manner and transformed into financing availability and interest rate preferences. Thus, a circular mechanism of “meeting standards - financing - reinvestment” is formed [13].

Differentiated design requires that the weights of command-and-control/market-based/voluntary tools vary under the factor endowments of different industries and regions. Industries with high pollution, high energy consumption and low technological resilience should, in the short term, rely on command-and-control to set compliance bottom lines, and combine this with green credit and equipment update subsidies to buffer capital pressure. For growth-oriented enterprises with strong technology absorption capabilities, the weight of market-based tools should be increased to form long-term incentives through interest subsidies, tax allowance and procurement priority. For leading enterprises in the stage of brand and reputation competition, voluntary tools such as ESG disclosure, ISO 14001 and green labels should be added to amplify their advantages in the capital market and high-end market. This three-dimensional matching of “capacity - potential - responsibility” enables policies to both stabilize the bottom line and not suppress the upper limit of green innovation [14].

The core of strengthening the market mechanism lies in pricing environmental externalities. On the one hand, the baseline setting, cross-regional mutual recognition and settlement rules of allowance trading (including carbon trading and pollutant discharge trading) should be improved to enable price signals to truly reflect the marginal emission reduction cost. On the other hand, the product system of green credit/green bond/sustainability-linked loans should be enriched, and environmental Key Performance Indicators (KPIs) should be linked to pricing to achieve the linkage of “performance - interest rate - term.” Meanwhile, building a unified environmental information disclosure platform will enhance the verifiability and comparability of data, directly converting green performance into financing and trading advantages.

4.2 Enterprise Level

Enterprises need to elevate green management from the compliance module to the main axis of corporate strategy, and implement it simultaneously in the three dimensions of mission-vision-values, capital budgeting and perfor-

mance management: Transform carbon intensity, energy saving and waste reduction into annual and rolling KPIs through science-based targets; introduce shadow carbon price and lifecycle costing in investment appraisal; institutionalize the green indicators of training, appraisal and incentive in GHRM. Meanwhile, through the supplier code of conduct of the green supply chain and the green procurement threshold, the upstream input quality and environmental performance are matched with brand positioning and market pricing.

In terms of innovation-driven development, enterprises should adopt the “two-speed R&D” strategy: achieve the rapid implementation of incremental innovation through process optimization, equipment retrofit and energy structure optimization in the short and medium term; focus on radical innovation in the medium and long term, lay out platform-based capabilities in key materials, core processes, digital twins and AI-enabled O&M, and promote the improvement of the technological boundaries of unit emissions and energy consumption. Evidence from quasi-natural experiments indicates that green credit can significantly enhance the green innovation output of highly polluting and energy-consuming enterprises, improve R&D sustainability by alleviating financing constraints, and there is heterogeneity in both industry and scale dimensions.

The core of the collaborative mechanism lies in “chain governance”. In terms of government-enterprise cooperation, regional environmental protection infrastructure and shared services (such as third-party governance platforms and testing and certification centers) can be jointly built through the PPP model, and participation in local standard-setting and pilot demonstration projects can shorten the technology diffusion cycle and lower the entry threshold for small and medium-sized enterprises. In terms of public supervision, through high-quality ESG disclosures, third-party assurance and grievance mechanisms, the preferences of consumers and investors are transformed into continuous reputation pressure and market dividends. Studies show that combining green strategy with carbon emission disclosure and environmental performance can significantly enhance the effect of enterprise value creation, and strategy plays a positive moderating role in this process [15]. Furthermore, in the green supply chain, through tiered requirements, supplier capability building and co-innovation, single-point governance can be extended to cross-level collaboration, enhancing network resilience and overall performance.

5. Conclusion

This study conducts a systematic analysis on the mechanism and optimization path of environmental protection policy for enterprise green management. The different functions and interactions of three types of policy tools, namely command-and-control, market-based incentives and voluntary mechanisms, in the process of green transformation were mainly examined.

Command-and-control policies take strict emission standards, market access thresholds and law enforcement supervision as the core and establish the fundamental guarantee of green management through external mandatory constraints. Such policies can directly change the production technology and management processes of enterprises, forcing them to carry out the transformation of cleaner production and the renewal of energy-saving and emission-reduction equipment, thereby ensuring the basic compliance of environmental quality.

Market-based incentives link environmental performance with economic returns, providing a sustainable driving force for enterprises. Mechanisms such as green credit, green bonds, and emissions trading schemes have reduced the financing costs of green investment, enabling enterprises to combine profit growth with the improvement of environmental performance. Such tools have performed outstandingly in promoting green innovation, expanding green production capacity and accelerating the renewal of environmental protection equipment, and have played a significant role in the structural adjustment of highly polluting industries.

Voluntary mechanisms, relying on reputation, social responsibility and industry collaboration platforms, encourage enterprises to go beyond regulatory requirements and proactively optimize their environmental management systems. ESG disclosure, green certification and green supply chain cooperation not only enhance external supervision and transparency but also promote the diffusion of green technologies and management experiences. This flexible drive oriented towards value recognition provides an endogenous impetus for enterprises to build long-term green competitiveness.

The three types of policy tools have formed a complementary combination in practice: mandatory policies set the bottom line, market-based incentives provide continuous impetus, and voluntary mechanisms promote deepening and innovation. This dynamic evolution model helps enterprises achieve the transformation from passive compliance to active innovation and maintain the stability and resilience of their green strategies in the face of external environmental uncertainties.

Overall, future policies and corporate strategies should focus on precision targeting, differentiated design and collaborative governance, releasing the green innovation potential of enterprises while ensuring environmental quality and promoting the coordinated development of economy and ecology. This is not only a key approach to achieving the “dual carbon” goals, but also an important foundation for building a high-quality, low-carbon and sustainable economic system.

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