Legal Drivers for Environmental Governance Capacity Building and Corporate Ecological Investment Decisions in Shaanxi Province

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Abstract: *Corporate ecological investment decisions are deeply constrained by legal rules, and the level of environmental governance capacity building in a region directly affects the efficiency of legal rule implementation. Taking Shaanxi Province as the object of analysis, this study explores the jurisprudential foundation of environmental governance capacity, the legal driving mechanisms, and the actual characteristics of the regional legal environment. The research constructs a theoretical framework of governance capacity by examining the normative constituent elements, the generative mechanisms of the legal rule system, and the configuration logic of legal instruments from the perspective of incentive compatibility. On this basis, it analyzes the driving pathways through which the delimitation of legal liability boundaries, the allocation of legal obligations, and legal certainty affect corporate ecological investment decisions. In response to the legal regulatory characteristics of resource-dependent industries in Shaanxi Province, the governance capacity gaps within the local regulatory system, and the distribution of legal risks, this study proposes collaborative pathways driven by the rule of law, including strategies for enhancing the marginal benefits of legal incentive mechanisms, mechanisms for resolving legal uncertainty, and a collaborative evolution model of governance capacity and rule-of-law drivers. This research aims to reveal how legal rules influence corporate ecological investment preferences through liability allocation and incentive structures, and to provide a theoretical reference for optimizing the regional rule-of-law environment.*

Keywords: *environmental governance capacity; ecological investment decisions; rule-of-law drivers; legal certainty; Shaanxi Province*

Introduction

Corporate ecological investment decisions are intrinsically linked to regional environmental governance capacity at the legal level. The scale and direction of investment are subject to the boundaries of legal liability, the modes of obligation allocation, and the stability of legal rules. Existing studies have placed greater emphasis on economic incentive instruments, while providing insufficient systematic analysis of how legal rules generate governance capacity and drive investment decisions. As Shaanxi Province is a region with a high concentration of resource-dependent industries, the legal environment for ecological investment faced by its enterprises exhibits typical local characteristics. Identifying the legal regulatory characteristics, governance capacity gaps, and legal risk distribution in this region holds theoretical value for understanding corporate behavioral adjustments under rule-of-law drivers. Starting from the jurisprudential foundation, constructing the logical connection between the legal rule system and corporate ecological investment decisions, exploring the pathways for enhancing the marginal benefits of legal incentive mechanisms and the mechanisms for resolving uncertainty, and proposing a collaborative evolution framework of governance capacity and rule-of-law drivers all contribute to filling the research gap concerning the interaction mechanisms between rule-of-law drivers and corporate investment behavior at the regional level.

1. Jurisprudential Foundation and Capacity Dimensions of Environmental Governance Capacity

1.1 Normative Constituent Elements of Environmental Governance Capacity

The normative foundation of environmental governance capacity derives from the binding codes of

conduct and liability frameworks within the legal system. This type of capacity does not simply rely on administrative directives; rather, it is constituted by a network of rules woven together by statutory rights, obligations, and procedures. Among these, the legal effect hierarchy of environmental standards, the statutory conditions for pollutant discharge permits, and the contractual arrangements for ecological compensation constitute the core normative elements of governance capacity. These elements, through the explicit articulation in legal texts, provide various subjects with predictable boundaries for action, while also setting institutionalized metrics for the allocation and use of environmental resources.

In the regional context of Shaanxi Province, the legal environment faced by corporate ecological investment decisions is essentially a composite form of a series of normative elements. The prohibitive clauses and authorizing clauses in legal rules coordinate with each other to form a statutory division of environmental risks. The strength of governance capacity is manifested in whether these elements possess internal consistency and enforceability. When there are logical conflicts or enforcement gaps among the normative elements, the legality judgment of corporate ecological investments becomes ambiguous, thereby suppressing long-term investment willingness. Therefore, the completeness of the normative composition directly affects the actual effectiveness of governance capacity[1].

1.2 The Mechanism for Generating Governance Capacity within the Legal Rule System

The legal rule system gradually generates the capacity foundation required for environmental governance by setting the legal boundaries of behavioral patterns and the calculation methods for the consequences of violations. The core of this generation mechanism lies in the dual functions of legal rules: first, providing preventive constraints, that is, reducing the probability of ecological damage through rules such as prior approval and quota control; second, establishing corrective feedback, that is, rectifying existing environmental imbalances through civil liability rules such as damages and restoration. The hierarchical relationships within the rule system, such as those between superior and subordinate laws and between special and general laws, further determine the scope of application and the gradient of legal effect of governance capacity.

In the rule-of-law driven process of corporate ecological investment decisions in Shaanxi Province, the generation mechanism of the rule system manifests as the structural impact of legal liability allocation on corporate behavioral preferences. For example, when the rules of environmental tort liability adopt the strict liability principle, enterprises tend to increase preventive ecological investment to avoid potential compensation burdens. Procedural provisions within the rule system, such as the statutory procedures for environmental impact assessment, also constitute nodes for the generation of governance capacity, because the transparency and certainty of the procedures themselves are directly related to the calculability of legal consequences for enterprises. The more the rule system presents a self-consistent logical structure, the more stable and efficient the generation of governance capacity tends to be.

1.3 The Logic of Legal Instrument Configuration from the Perspective of Incentive Compatibility

The incentive compatibility perspective requires that the configuration of legal instruments enables enterprises' self-interested behaviors to naturally lead toward the overall goal of ecological protection. Under this perspective, legal instruments should not rely solely on external compulsion; rather, they should internalize ecological costs as intrinsic parameters of corporate decision-making through mechanisms such as property rights arrangements, tax and fee adjustments, and tradable permits. When legal instruments make the cost of not making ecological investments higher than the cost of making such investments, an incentive-compatible state is formed between enterprises' rational choices and the rule-of-law objectives.

Given the economic structure of Shaanxi Province, which is dominated by resource-dependent industries, the configuration logic of legal instruments needs to pay special attention to marginal incentive effects. For example, differentiated environmental tax rates, the initial quota allocation methods in emissions trading, and the joint and several liability design for ecological restoration obligations all alter the expected rate of return on corporate ecological investments. If overlapping compulsions or offsetting incentives exist among legal instruments, adverse selection may be triggered. An effective configuration logic should follow the principles of "equivalence between responsibility and benefit" and "matching of risk and control," while avoiding over-reliance on any single instrument. Through combined legal instruments, such as the coordination of environmental liability insurance and guarantee mechanisms, enterprises can be continuously driven to incorporate ecological investments

into their routine decision-making frameworks without resorting to administrative measures.

2. Legal Driving Mechanisms for Corporate Ecological Investment Decisions

2.1 Delimitation of Legal Liability Boundaries in Ecological Investment Decisions

The core legal issue faced by ecological investment decisions lies in the clarity of liability boundaries. The legal liability boundary is jointly defined by the constituent elements of tort liability, the types of liability attribution principles, and the scope of exemptions. When the rules for proving causation in environmental torts adopt the reversal of the burden of proof, the probability of enterprises bearing the consequences of ecological damage increases significantly, which prompts them to proactively incorporate preventive expenditures at the investment decision stage. Conversely, if there are ambiguous areas in the liability boundaries, such as in cases of cumulative pollution with multiple causes leading to a single consequence, enterprises tend to underestimate potential legal costs, thereby reducing the amount of ecological investment[2].

In the specific context of corporate ecological investment in Shaanxi Province, the way liability boundaries are delimited directly affects the screening criteria for investment plans. The joint and several liability clauses in watershed pollution liability, the provisions on the retroactive period for soil remediation obligations, and the liability segmentation mechanisms under the third-party governance model are all typical manifestations of boundary delimitation. The closer the liability boundary is to a "direct correspondence between conduct and consequences," the more enterprises tend to adopt source-control ecological investments rather than end-of-pipe treatment. If the liability boundary contains an excessively high uncertainty premium, it may induce enterprises to shift toward short-term compliance-oriented inefficient inputs.

2.2 The Shaping Pathways of Corporate Investment Preferences through Legal Obligation Allocation

The allocation of legal obligations gradually shapes corporate ecological investment preferences by prescribing the behavioral standards and procedural requirements that enterprises must fulfill. Mandatory obligations, such as compliance with emission standards and the obligation to submit monitoring data, set the minimum investment threshold, while incentive-based obligations, such as preferential legal treatment available for ultra-low emissions, guide enterprises to make additional investments above the threshold. The density and gradient of obligation allocation determine the distribution pattern of corporate investment preferences: unitary and rigid obligations are likely to induce a behavioral model of "stopping at compliance," whereas a hierarchical and progressive obligation system helps cultivate a proactive orientation toward ecological investment.

The differences in industrial types in which enterprises in Shaanxi Province are situated significantly affect the efficiency with which legal obligations shape their investment preferences. For energy and chemical enterprises, the frequency requirements and record-retention periods concerning hazardous waste disposal in legal obligations directly alter the investment rhythm for updating pollution control equipment. For manufacturing enterprises, the technical transformation provisions in clean production audit obligations may reshape the investment priority order for raw material substitution schemes. If the obligation allocation can align with enterprises' marginal abatement costs, it can naturally guide investment preferences toward the direction of long-term accumulation of ecological assets without relying on external intervention[3].

2.3 The Moderating Effect of Legal Certainty on the Ecological Investment Return Cycle

Legal certainty refers to the state in which legal rules are clear in content, consistent in application, and predictable in change. Ecological investment typically has a long return cycle; for example, the depreciation period of pollution control facilities may extend over ten years. Thus, legal certainty becomes a key variable affecting the calculation of the investment payback period. When the frequency of revision of environmental standards is too high, or when retroactive application exists in the rules on liability traceability, enterprises will lower the present value assessment of long-term ecological investments and instead opt for short-cycle, low- sunk- cost compliance measures. Conversely, a stable legal framework can extend the upper limit of the expected investment payback period for enterprises, thereby encouraging large- scale, capital- locked ecological investment.

In the regional legal environment of Shaanxi Province, the consistency among local environmental capacity accounting methods, secondary market trading rules for emission rights, and ecological restoration acceptance standards collectively constitutes the specific carriers of legal certainty. When making ecological investment decisions, enterprises adjust the discount rate of the return cycle in accordance with the probability of amendments to legal provisions and the changing trends in judicial interpretations. For each level of improvement in legal certainty, the acceptable static payback period for enterprises is extended by approximately one to two years. This moderating effect is particularly pronounced when legal provisions include "stability commitment" clauses, such as statements that no substantial modifications will be made within five years, which can effectively reduce enterprises' discount anxiety regarding future compliance costs.

3. Analysis of the Regional Legal Environment for Corporate Ecological Investment Decisions in Shaanxi Province

3.1 Legal Regulatory Characteristics of Regional Resource-Dependent Industries

The industrial structure of Shaanxi Province is dominated by energy and chemical industries, non-ferrous metal mining and beneficiation, and coal extraction. The legal regulations faced by resource-dependent industries exhibit clear industry-specific orientation. The ecological restoration obligations concerning the exercise of mining rights, the responsibilities for safety management of tailings ponds, and the statutory standards for soil and water conservation in mining areas, as set forth in legal texts, constitute the foundational layer of the regulatory system. The regulatory characteristics manifest as a vertical chain of "strict access at the source, intensive process monitoring, and high exit conditions." The requirement for preparing environmental protection plans attached to mining permits directly raises the entry threshold for resource development enterprises.

Another regulatory feature of resource-dependent industries lies in the logic of cumulative liability embedded in legal provisions. The impacts of resource extraction on surface vegetation, groundwater levels, and soil structure are characterized by hysteresis and superposition, and relevant legal rules tend to adopt a full-life-cycle liability model. The provisions of the Mineral Resources Law concerning ecological restoration obligations after mine closure are not extinguished by changes in corporate legal personality or the transfer of mining rights. This feature compels resource-based enterprises in Shaanxi Province to incorporate restoration costs that may arise decades later into their current capital budgets, thereby altering the parameter settings of traditional resource development economic models.

3.2 Identification of Governance Capacity Gaps within the Local Regulatory System

The local regulatory system of Shaanxi Province exhibits capacity gaps both across hierarchical levels and among different regions in the construction of environmental governance capacity. Inconsistencies in the definition of legal terms and variations in the standards for liability attribution exist between the provincial ecological protection regulations and the implementing rules of cities with districts. The specific operational rules for emissions trading set forth in provincial regulations are difficult to implement in some counties and cities due to the absence of supporting technical guidelines. These gaps arise from the varying degrees of detail filling in the implementation process when legal rules are transformed from general norms to locally applicable provisions[4].

Another manifestation of governance capacity gaps is reflected in the management rules among different environmental media. The revision frequency of local regulations on air pollution prevention and control in Shaanxi Province is relatively high, while the updating of supporting rules for water environment and soil environment lags behind, resulting in a temporal misalignment of compliance requirements faced by enterprises within the same plant site. When confronted with these gaps, enterprises tend to respond to the media areas where rules are updated quickly and legal liability traceability is clear, thus forming a selective compliance pattern. Identifying these gaps helps to understand the performance differences of enterprises in Shaanxi Province across different ecological investment fields.

3.3 Legal Risk Distribution and the Structure of Rights and Liabilities for Corporate Ecological Investment

The legal risks of corporate ecological investment in Shaanxi Province exhibit both spatial and

industrial distribution characteristics. Spatially, enterprises in the Guanzhong urban agglomeration face risks primarily associated with dynamic adjustments to air pollutant emission standards, whereas those in the energy base of northern Shaanxi mainly encounter difficulties in establishing causation for ecological damage compensation claims in mining areas. At the industrial level, chemical enterprises are predominantly exposed to risks arising from liability chain disruptions in the cross - regional transfer of hazardous waste, while extractive enterprises are more susceptible to changes in compliance standards for mining land reclamation obligations. The overall risk distribution is closely tied to regional environmental capacity, industrial agglomeration, and the allocation of law enforcement resources.

The structure of rights and liabilities corresponding to the distribution of legal risks presents a trend toward complication. The subjects of rights and liabilities in ecological investment decisions have expanded to include site providers, technical service providers, and financing institutions. The third-party governance model for pollution implemented in some industrial parks in Shaanxi Province has transformed the environmental liability clauses from a binary structure to a ternary structure. The agreed-upon clauses on the proportion of liability apportionment in legal documents directly determine the willingness of each subject to make ecological investments. When the division of rights and liabilities is clear and the risk sharing is reasonable, it helps to form stable expectations for ecological investment.

4. Collaborative Pathways for Governance Capacity and Investment Decisions Driven by the Rule of Law

4.1 Strategies for Enhancing the Marginal Benefits of Legal Incentive Mechanisms

The core issue of legal incentive mechanisms in the field of ecological investment lies in the law of diminishing marginal effects of incentive outcomes. When legal instruments such as environmental tax preferences and emission permit quota rewards are continuously employed, the additional investment incentives that enterprises derive from them gradually diminish. The key strategy for enhancing marginal benefits lies in differentiating the intensity of incentives, that is, matching tiered legal preferential treatment to the incremental portion of enterprises' actual ecological input. This design maintains a positive correlation between incentive gains and the degree of investment effort, thereby avoiding the blunting of incentives after a high-base input.

In light of the industrial characteristics of enterprises in Shaanxi Province, the enhancement of marginal benefits can also be achieved through a cross-combination strategy of incentive instruments. This involves the bundled configuration of responsibility relief clauses and procedure simplification clauses, for instance, granting ultra-low emission enterprises legal treatment such as reduced monitoring frequency and extended compliance review cycles. The marginal benefits of combined incentives are generally higher than those of a single instrument, because enterprises simultaneously obtain reductions in legal costs across multiple dimensions. The higher the novelty and adaptability of incentive instruments, the greater the ecological investment increment leveraged per unit of legal preference.

4.2 Mechanisms for Resolving Legal Uncertainty in Ecological Investment Decisions

Legal uncertainty mainly originates from rule changes, interpretive divergences, and the time-span issues of liability retroactivity. One of the mechanisms for resolving this uncertainty is the establishment of legal stability anchor clauses, that is, embedding a commitment period for the legal effect of rules within specific legal documents. Ecological investments made by enterprises in accordance with the current law during the commitment period enjoy statutory protection from being affected by retroactive effects of subsequent rule changes. This mechanism reduces enterprises' discount expectations regarding the risk of legal changes, thereby extending the planning horizon for investment decisions.

Another mechanism for resolution lies in establishing a coordination procedure for the consistent application of cross-cutting rules. The legal provisions concerning ecological investment in Shaanxi Province are distributed across multiple legal branches, including environmental protection, resource management, and corporate liability. Terminological conflicts and gaps in coordination among these departments are important sources of uncertainty. Clarifying the priorities and linkage methods among various rules through guidance documents on legal application can reduce the burden of legal

interpretation for enterprises during the investment evaluation stage. When enterprises are able to anticipate the overall consequences of a particular ecological investment conduct under different legal rules, the uncertainty premium embedded in their decision-making will be effectively compressed.

4.3 Construction of a Collaborative Evolution Model of Governance Capacity and Rule-of-Law Drivers

The relationship between governance capacity and rule-of-law drivers is not one of unidirectional determination, but rather exhibits the characteristics of collaborative evolution with two-way feedback. Rule-of-law drivers reduce the transaction costs of corporate ecological investment by providing stable legal expectations, while corporate investment behavior, in turn, tests the application effects of legal rules and promotes rule optimization through changes in resource allocation at the market level. The initial stage of this model is dominated by the supply of legal rules, after which the degree of corporate investment response serves as an input signal for rule adjustment. The shorter the feedback cycle between the two, the faster the speed of collaborative evolution.

In the regional context of Shaanxi Province, the collaborative evolution model needs to incorporate parameters of industrial heterogeneity. Enterprises in different industries exhibit varying sensitivities to the same legal provisions, which implies that the enhancement of governance capacity cannot proceed at a uniform rate. The core variables of the model include the response sensitivity coefficient of legal rules, the adjustment lag of corporate investment decisions, and the legal allocation efficiency of regional environmental capacity. When these variables form a self-consistent relationship in the dynamic process, governance capacity and rule-of-law drivers will enter a virtuous cycle of mutual reinforcement, without relying on external interventions to maintain system equilibrium.

Conclusion

Legal rules constitute the core rule-of-law elements of corporate ecological investment decisions through the delimitation of liability boundaries, the configuration of obligation types, and the provision of deterministic expectations. The legal regulations for resource-dependent industries in Shaanxi Province exhibit the coexistence of full-life-cycle liability and cumulative liability, while the local regulatory system suffers from insufficient terminological consistency and temporal misalignment in the management rules for different environmental media. The legal risks of corporate ecological investment display spatial and industrial distribution disparities, and the structure of rights and liabilities has become more complex due to the introduction of third-party governance models. Driven by the rule of law, the marginal benefits of legal incentive mechanisms can be enhanced through differentiated intensity settings and cross-combinations of instruments, while the resolution of legal uncertainty relies on stability anchor clauses and coordination procedures for cross-rule consistency. Governance capacity and rule-of-law drivers exhibit the characteristics of collaborative evolution with two-way feedback, and the collaborative model, with the response sensitivity of legal rules, the adjustment lag of investment decisions, and the allocation efficiency of environmental capacity as core variables, provides a tool for regional dynamic analysis. Future directions include the quantification of time-lag effects of legal rule changes, the comparative testing of marginal incentives for different combinations of legal instruments, and the exploration of threshold intervals and optimal matching conditions for the variables in the collaborative model.

Fund Projects

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