

The Impact of Environmental Legislation in Shaanxi Province on Corporate Ecological Investment Decisions: From the Perspective of Environmental Responsibility Governance

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Abstract: Shaanxi Province has issued environmental laws that set emission limits, standards for technology accessibility, rules on liability tracing, etc., and thus has had some effect on enterprises' ecological investment decisions. Under the rule of environmental responsibility, this paper studies how the stringency of laws has affected the internal allocation of corporate funds, changes in management incentives and investment thresholds, etc. Determine the intervention mode of the responsibility governance system on the sedimentation of ecological assets and the allocation of operational costs; investigate the shaping effect of compliance pressure on staged adoption of technologies; clarify the matching logic between responsibility tiers and investment cycles, etc. At the same time, we will also study the effect of legislative attributes on the marginal return of ecological investment, the positive correlation between the strength of liability traceability mechanisms and corporate willingness to protect ecological capital, and the disturbance and rebalancing mechanism of legislative update frequency on the stability of investment decisions. Therefore, it can be seen that the environmental regulations have increased the company's costs of compliance by making them more expensive and difficult to manage, thus altering investment plans and behaviour. Analysis of the Impact of Regional Environmental Laws on the Long-term Capital Allocation of Companies via the Chain of Responsibility Governance System.

Keywords: Corporate Governance, Environmental Law in Shaanxi Province, Ecological Investment Decisions, Environmental Responsibility Governance, Investment Thresholds

Introduction

The ecological investment decisions of enterprises will affect the improvement of the environment in some areas and how well businesses carry out green development, but it has not been explicitly specified by external institutions how this will be achieved and to what extent. Most of the previous studies have only found a simple positive linear relationship between the stringency of legislation and corporate environmental investment, and have not examined how the internal structure of the responsibility-governance system affects investment decisions, such as the distribution of liability, traceability mechanisms, updates to legislation, etc. Based on the legislative practice in Shaanxi Province, we can consider the concept of environmental responsibility governance; thus, the obligation clauses in legislative texts can be transformed into visible decision-making constraints for enterprises, and it can be explained why, under the same regulatory system, different companies have different levels of ecological investment and follow various structural development paths. The purpose of this paper is to examine the influence of the formation mechanism of the three dimensions of legislative stringency, the system of responsibility governance and features of legislative differentiation on corporate resource allocation, technology adoption and return expectations. We hope that through this study, we will be able to address the lack of knowledge in our understanding of the transmission mechanism of the responsibility chain and offer theoretical support for helping enterprises make reasonable investment decisions in light of regulatory changes.

1. Mechanisms of Association between Stringency of Environmental Legislation and Corporate Willingness to Invest in the Environment

1.1 The Guiding Role of Environmental Legislative Constraints on Corporate Internal Resource Allocation

Emission Limits and Technology-Access Standards in the environmental laws of Shaanxi Province directly change the constraint conditions of a company's production function. Given the above legal conditions, the company has been forced to change the proportion of capital allocation among old-equipment upgrades, pollution control and end-of-pipe treatment. In terms of the governance of responsibility, some of the legislative provisions have moved the external costs of environmental damage into the category of expected liabilities in corporate accounts, and management is now paying more attention to compliance with ecological assets in the capital budgeting process. First of all, there is no need to comply; by moving the marginal abatement cost curve, it will be more efficient to use funds in other places that have clear statutory returns on investment.

In fact, most enterprises have already compared the compliance contribution rates and capital utilisation periods of the various environmental protection projects. The more specific the environmental laws and regulations are, the higher the probability that they will be covered by the ecological investment fund and directly implemented by enterprises. Given that there is a high concentration of volatile organic compounds in the air, some enterprises have installed dust collectors, scrubbers and other equipment to reduce pollutant emissions. Therefore, there has been a change in the distribution of internal decision-making power, and the finance and production departments have established a new negotiation model for sharing compliance costs; thus, the proportion of ecological assets in the company's fixed-asset structure has been gradually rising^[1].

1.2 The Moderating Effect of Statutory Liability Attribution on Managers' Ecological Investment Decisions

If the law and regulations stipulate that enterprises and managers will be held liable for environmental damage caused by ecological disasters, then the risk-return trade-off for these managers will be different. According to the statutory codification of liability attribution, in the event of environmental non-compliance, those who made the decisions at the company level will be jointly and severally liable for fines imposed on the company and individual economic compensation demands and occupational restrictions. Therefore, the institution will reduce the motivation of managers to delay ecological investment in favour of short-term profits, or else the potential liability costs of such a delay will exceed the current savings in expenditure. The entire length of the chain of statutory liability will affect how much weight management gives to environmental protection in the approval of capital investment.

Based on the reasons for the investment decision, the degree of division of the liability clause will directly affect the risk weights set at the start of the feasibility study. In general, the management of ecological investment proposals should provide for liability isolation; that is to say, special environmental protection fund pools can be established or third parties can be employed to determine environmental liability to reduce the risk of ambiguity in the interpretation of regulations by individual decisions. At the same time, statutory liability also has a relatively high investment hurdle rate for the company; that is to say, the minimum required rate of return on ecological projects is higher than that on traditional expansion projects. The change in motivation is not an increase in the sense of morality, but rather a rational expectation of legal consequences; thus, it can help maintain order in the system of ecological investment behaviour at the organisational level.

1.3 The Linkage of Corporate Risk Perception and Investment Thresholds Under Regulatory Enforcement Uncertainty

Due to changes in the text of Shaanxi Province's environmental legislation and differences in the level of enforcement discretion, enterprises are less certain about how the compliance costs will be distributed in the future. Uncertainty does not have to be a decrease in ecological investment; rather, it can change the company's investment threshold by altering the Bayesian update of the probability of investment failure. When the company finds out that the minimum required rate of return for ecological investment projects in some areas or at certain times has risen due to changes in regulations, it will add this extra compliance cost. The risk premium adjustment for responsibility governance is actually an

institutional response to the uncertainty of legislation^[2].

Generally speaking, due to the uncertainty of enforcement, enterprises will first invest in small-scale, reversible adaptive environmental retrofits and then decide whether to increase the scale of investment based on the results of the next round of regulatory enforcement activities. Therefore, the relationship between the threshold value and uncertainty is not linear; that is to say, in a certain range of uncertainty, firms will increase expenditure on information collection and pilot projects for ecological investment to reduce blind spots in decision-making. If the uncertainty is too high, then all the optional ecological projects will have to be postponed. The link explains why the speed of investment for different companies is not the same under the same legislative system; the main reason is that they have different subjective probabilities of stable regulatory enforcement and thus set various investment thresholds.

2. Evolutionary Pathways of Ecological Investment Structure from the Perspective of Environmental Responsibility Governance

2.1 Intervention Modes of the Responsibility Governance System in the Sedimentation of Environmental Assets and Allocation of Operational Costs

According to the governance system of environmental responsibility, enterprises have some obligations for environmental remediation and damage compensation, so the rules for the initial recognition and subsequent measurement of environmental assets have been revised. Based on the Design of the institution mentioned above, the assets of pollution treatment facilities and ecological monitoring stations are no longer considered production costs but have been reclassified as material carriers of statutory obligations. The more detailed the division of governance responsibilities, the higher the likelihood that a company will allocate a certain proportion of its operating cash flow to environmental protection expenses in a special fund and exclude this amount from the general pool of regular expenses. As the rate of asset sedimentation rises, so does the need for amendments to the responsibility clause; that is to say, if the scope of responsibility is reduced, enterprises will be less willing to invest in such assets.

A system of responsibility has been introduced to distribute the division of operating expenses, and employees are now more conscious of the environmental costs of production at all times. In accordance with the liability chain in the regulations, the company should recognise the costs of end-of-pipe treatment, process control and ecological remediation separately in the income statements of each business unit. The distribution method will no longer be a single large sum for the funds of environmental protection; instead, we will set up cost codes for each level of responsibility in the financial system. In fact, the company has changed the rules for internal transfer pricing to spread the high environmental costs of the production line by increasing the depreciation expense of ecological assets; thus, a cost-pressure transmission path has been established in the organisation and resources have been shifted to processes with a relatively lower liability burden. In addition, under the itemized liability attribution mechanism, enterprises need to list the environmental expenditure caps for all areas of responsibility separately in the preparation of the annual budget; any excess amount should be covered by that specific area of responsibility, and thus the cost allocation will be relatively strict^[3].

2.2 The Shaping Effect of Environmental Compliance Pressure on the Staged Adoption of Ecological Technologies by Enterprises

Given the compliance deadlines and emission reduction gradients in the environmental laws of Shaanxi Province, only one of the available technologies should be selected at a time by the company. Not all demands for ecological technology are the same; rather, due to regulatory pressure from the authorities, enterprises have been forced to add all kinds of low-cost operational optimisation technology, medium-investment end-of-pipe treatment technology and high-capital source-substitution treatment technology sequentially. The Staged form is due to the different payback periods of the various technologies and the corresponding compliance deadlines. Most of the companies will use the management measures in the first stage that do not require significant changes to the equipment, and only when the remaining compliance period is short will they switch to the technology upgrade stage and need to invest in fixed assets.

At the same time, one should also choose a suitable mature or new technology for the company and do so promptly. There is still a long way to go before the legal compliance deadline, so some

enterprises will conduct a small-scale pilot project for the new ecological technology, collect operational data, and then expand it throughout the company. When there is high demand for compliance, many companies have already released good technology solutions that other companies have also used successfully; thus, they are willing to do so to avoid the risk of non-compliance due to technological failure. As a result of the shaping effect mentioned above, all firms in the same industry have begun to take similar technological paths, especially in areas where the government has issued strong and uniform regulations; thus, the staged division of ecological technology adoption has gradually converged to form an observable temporal pattern of technology diffusion. It should be pointed out that if the gradient design of compliance pressure reserves a sufficient buffer period for technological adaptation, more forward-looking technological solutions will be introduced early in the stage by the firms, and they will be able to break free from the original rhythm of passive adoption^[4].

2.3 The Matching Logic for Differences in Responsibility Governance Tiers and Investment Cycle Durations

Generally speaking, the levels of responsibility for the governance system of environmental responsibility are on-site operation responsibility, workshop management responsibility and corporate legal liability; different levels of attribution for liability correspond to different cycles of investment decisions. Most of the responsibilities at the operating level are routine maintenance work, have a short decision-making cycle, and are generally included in the quarterly or annual budget. Generally speaking, a company's environmental responsibility refers to the whole system of environmental compliance within the company, and the related investment projects, such as plant-wide environmental improvement or multi-year ecological restoration projects, often cover a period of three to five fiscal years. As shown in the matching logic above, the higher the level of responsibility, the longer the lower bound for the investment cycle is set, and it is difficult for enterprises to avoid the capital expenditure demand of high-level responsibilities by using short-term funds.

Based on the above observations, the clarity of the tiers in responsibility governance will affect how well enterprises can manage a portfolio of investment projects with different cycles. When the division of responsibilities at all levels is clear, the company can carry out several ecological investment projects with different durations at the same time and use the cash flow recovered from short-term projects to fund the capital occupation of long-term projects. At the same time, if there is any overlap or ambiguity in the division of responsibilities, the company will generally extend the investment term uniformly to increase the buffer against the uncertainty of liability tracing. Based on the matching logic above, enterprises with clear division of responsibilities at all levels of the organisation have achieved a much higher proportion of short-cycle projects in their ecological investment portfolios than those that do not have an unambiguous governance structure for responsibility. Distribute the division of responsibilities among the different levels of the company, break down the long-term investment into several short-term, verifiable sub-stages, and reduce the risk that the entire investment chain will be disrupted due to unclear liability at any link.

3. Shaping Corporate Expectations for Ecological Investment Returns in Light of All the Features of Environmental Legislation

3.1 The Modifying Effect of Fine-Grained Changes in Regulatory Provisions on the Marginal Returns of Ecological Investment

Amendments to the Regulations on Emission Concentration, Total Volume Control and Monitoring Frequency of Shaanxi Province's Environmental Laws will directly change the marginal abatement benefit curve of corporate ecological investment. If the government reduces the upper limit of a certain pollutant from a high number to a low number, the old end-of-pipe treatment facilities will no longer meet the new standard to the same extent; that is to say, the additional benefit of compliance obtained by adding another unit of investment will gradually decrease. Therefore, the company will adjust the break-even point of ecological investment; at the beginning of the limit-tightening period, it is necessary to increase investment promptly to meet the new standards, but as soon as the limit of technological feasibility is reached and the marginal return on investment approaches zero, further investment will not be economically viable^[5].

There are also some differences in the combined effect of the various regulatory provisions. At the same time, there is a problem of cost for the standards on the discharge of water pollutants and the

frequency of soil monitoring; they were not originally part of the ecological investment project. In calculating the marginal benefit of a particular type of investment, one should also account for the expected compliance costs under the requirements of other regulations. Based on the discussion and revision of the regulations, it has been decided that the marginal return on ecological investment will no longer be determined by a single rule but will be capped at the lower limit of the entire regulatory system. In fact, the chosen technology will have many special demands at the same time; although it has a high initial cost, its total marginal benefit will generally be higher than that of decentralized investment.

3.2 The Positive Correlation between the Strength of the Liability Traceability Mechanism and Corporate Will to Protect Ecological Capital

The strength of the liability traceability mechanism can be seen in how far back we can seek compensation for historical environmental damage, who is responsible for providing evidence, and how widely joint and several liability is applied. If the strength of the traceability mechanism is relatively weak, there is still a risk that the company's behaviour in the past will not be known during the assessment of liability. Therefore, the institution will place more importance on the expected service life of the already-invested ecological assets, and if, through traceability, it is found that some equipment or processes do not cover the historical emission gaps, these assets may need to be decommissioned early or will face pressure to undergo additional retrofitting. Therefore, the enterprises will be more willing to protect ecological capital and will be ready to invest in technologies that meet the new environmental regulations for a longer time.

In this way, the form of preservation is that enterprises will be more willing to build environmentally friendly facilities in modules; thus, when extending the scope of regulatory traceability, only parts of these assets need to be replaced, not all of them, and it will be possible to reduce the accounting life of ecological assets in depreciation policies to speed up capital recovery and reduce traceability risks. The positive correlation is even stronger in the case of joint and several liability clauses for the tracing of liability; that is to say, the firm can also be held liable for environmental pollution caused by upstream or downstream enterprises. The company will extend the concept of ecological capital preservation to all links in its supply chain management, build an improved and more traceable environmental monitoring system, ensure that the ecological assets owned by the company have a clear chain of compliance evidence in the liability traceability chain, and thus reduce the risk of revaluation of asset values.

3.3 Disturbance and Rebalancing in the Stability of Investment Decisions due to the Update Frequency of Legislative Content

The revision cycle and update frequency of Shaanxi Province's environmental laws will show how much the regulations change in the future. If the update frequency is too high, it will be difficult for enterprises to know the full life-cycle return expectations of ecological investment projects based on the current regulatory content, as soon as the investment is fully recouped, the regulations may have changed again. The first kind of harm is that the company will be reluctant to invest in long-term ecological construction projects, such as soil remediation of a construction site or the construction of multi-year wastewater treatment facilities, and will instead increase its expenditure on short-term environmental protection equipment or outsourced treatment services. Therefore, the time horizon for the investment decision has been shortened, and enterprises are now more likely to use real option pricing to value ecological projects and keep the option to exit at any time.

Due to frequent changes, there have been some business interruptions, and thus a rebalancing mechanism for investment decisions has been introduced. Another way is to build an internal early warning and investment-decision link model, and based on the possible changes in laws and regulations in the future, carry out scenario analysis of the project. According to the historical data of how often and in which areas regulations have changed, some parts of the field of ecological technology have been subject to medium- to long-term risks more frequently; therefore, it is necessary to invest in both low-risk basic compliance assets and high-risk, high-efficiency emission-reduction assets to build a risk hedge for the investment portfolio. Another way is to reduce the time it takes to collect information for investment decisions in advance, change the original annual environmental compliance review to a quarterly rolling assessment, and thus find out about any changes in regulations early and adjust the frequency of investment accordingly. Rebalancing will help the company maintain the same total amount of ecological investment after frequent revisions to the content of the law; only the structure

and timing of the investment need to be adjusted.

Conclusion

Environmental laws in Shanxi Province have eased restrictions, clarified the division of responsibilities, increased enforcement uncertainty, and thus reduced the incentive for investment in ecological improvement and lowered the threshold for such investment. A responsibility-governance system will change the form of asset sedimentation, the distribution of operating costs, the speed of technology adoption and the matching of investment cycles, and thus create a staged evolutionary path for the ecological investment structure. Among all the attributes of legislation, precise provisions, good traceability mechanisms and frequent updates have changed the expectations for marginal returns on ecological investment, motivated companies to increase their ecological capital, and thus brought about new adjustments in investment decisions during times of disruption. First, we can see that enterprises in different sectors, such as resource-intensive ones and technology-intensive ones, have different amounts of environmental investment and different reasons for this difference under the same legal system. Second, it will be possible to construct a dynamic model that can simulate the non-linear relationship of adjustment in legislative provisions and the restructuring of corporate investment portfolios. Third, increase the range of the transmission area for the analysis framework of supply chain environmental responsibility and determine whether ecological investment behaviour at different levels of the supply chain is synergistic or substitutive.

Fund Projects

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