

Research on the Internal Transmission Mechanism and Quantitative Assessment of ESG Value Creation

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Abstract. This research aims to deeply explore the internal transmission mechanism and quantitative evaluation methods for ESG value creation, to answer the key question: "How does ESG investment specifically translate into corporate value?" This paper uses literature reviews, case analyses, and quantitative model development to examine the internal mechanisms by which ESG initiatives improve efficiency, reduce risks, and enhance brand value. It develops methodologies and toolkits for quantitatively evaluating the microeconomic benefits of ESG initiatives and, at the same time, builds a set of strong, persuasive internal communication cases. The study finds that a clear internal transmission mechanism and quantitative evaluation results can effectively help business managers strengthen their ESG investment decisions and provide strong support for promoting the sustainable development of enterprises. In addition, this research enriches the field of management research on ESG value creation and lays a foundation for subsequent related research.

Keywords: ESG, Value Creation, Internal Transmission Mechanism, Quantitative Evaluation, Enterprise Management

1. Introduction

Amidst escalating global climate change, resource scarcity, and social tensions, sustainable development has emerged as the core driver of corporate strategic transformation. Environmental, Social, and Governance (ESG) principles have evolved from peripheral concerns into pivotal dimensions of corporate value creation. Their role in enhancing long-term competitiveness through integrating non-financial factors has been extensively validated—existing research confirms that ESG performance can significantly elevate corporate value by alleviating financing constraints [1] and optimising resource allocation [2], with particularly pronounced effects in non-state-owned enterprises and high-tech industries. Nevertheless, existing research faces dual cognitive gaps: firstly, lagging studies on micro-level transmission mechanisms—while green procurement and employee welfare initiatives have been shown to enhance operational efficiency [3], the causal chain linking these to corporate financial performance remains unclear; secondly, insufficient innovation in quantitative assessment tools—traditional financial metrics struggle to capture the implicit benefits of ESG measures, such as the often underestimated contribution of employee satisfaction to productivity [4]. Consequently, this study focuses on resolving the practical paradox of 'how ESG

investments translate into corporate value' by constructing an integrated analytical framework of 'measures-pathways-performance'. This systematically deconstructs the triple transmission mechanism of ESG value creation—the synergistic effects of green procurement on operational efficiency, employee welfare on productivity enhancement, and environmental compliance on risk mitigation—while innovatively developing a quantitative assessment system. This includes an ROI model for energy-saving projects and an employee satisfaction contribution assessment tool. Employing a mixed-methods approach, the research validates theoretical assumptions using 2018-2023 panel data from A-share listed companies in Shanghai and Shenzhen, while conducting a multi-case comparative analysis of ESG practices in representative enterprises. Its theoretical contribution lies in revealing multidimensional transmission patterns of ESG value creation, extending the explanatory boundaries of resource-based theory and stakeholder theory. Its practical value manifests in providing enterprises with an actionable ESG investment decision-making toolkit to resolve internal communication challenges, while offering policy references for regulators to formulate differentiated ESG guidelines. Research data indicates that enterprises systematically implementing ESG strategies achieved an average revenue growth rate increase of 25% and a net profit margin improvement of 3 percentage points over three years [5], validating the effectiveness of this methodological framework.

2. Literature review

2.1. Theoretical foundations of ESG

The emergence and sustained development of ESG principles are underpinned by core theories such as stakeholder theory and sustainable development theory. Stakeholder theory, proposed by Freeman and Evans in 1990, emphasises that enterprises must holistically consider the demands of multiple stakeholders—including shareholders, employees, customers, suppliers, and communities—during their operations [6]. This theory provides crucial theoretical grounding for ESG practices, as strong ESG performance signals corporate trustworthiness to stakeholders, reduces transaction costs, and enhances stakeholder efficiency in value creation. Furthermore, resource dependency theory reinforces this perspective, arguing that corporate survival and growth depend on drawing resources from the external environment. Proactively assuming environmental and social responsibilities thus helps firms secure critical strategic resources, thereby building competitive advantage [6]. Sustainable development theory elucidates ESG's significance from a broader perspective, asserting that enterprises must balance environmental protection and social responsibility with economic pursuits to achieve coordinated economic, social, and ecological progress [7]. These frameworks have not only catalysed the global dissemination of ESG principles but also established a robust theoretical foundation for subsequent research.

In recent years, with the introduction of the 'dual carbon' goals and the deepening of green development concepts, the application scenarios for ESG-related theories have expanded significantly. For instance, in the financial sector, ESG performance has become a crucial metric for banks and capital markets to evaluate corporate credit risk and value-creation capabilities [8]. This trend indicates that ESG represents not merely an ethical obligation, but an imperative for enterprises seeking long-term sustainable development. An examination of these foundational theories reveals their influence on ESG practice manifests primarily in three dimensions: firstly, it reinforces corporate emphasis on stakeholder relationships; secondly, it compels enterprises to integrate ESG into strategic planning to gain competitive advantage; and thirdly, it drives the continuous refinement of ESG evaluation systems and methodologies [7,9].

2.2. Research progress on ESG value creation

Scholars both domestically and internationally have conducted extensive research on ESG value creation, primarily focusing on the impact of ESG on corporate value and financial performance. Early studies predominantly relied on single-dimensional analyses, such as environmental performance, social responsibility outcomes, or corporate governance levels, yielding diverse conclusions. However, as composite ESG metrics are increasingly applied, research has shifted to examine the influence of overall ESG performance on corporate value. Based on a review of the literature, four primary perspectives currently exist within academia regarding the relationship between ESG and corporate value: positive correlation, negative correlation, a U-shaped relationship, and no correlation. Among these, research demonstrating a positive correlation predominates. Most literature indicates that strong ESG performance can positively enhance corporate value through multiple channels, such as alleviating financing constraints, improving operational efficiency, and reducing financial risk [6].

Furthermore, recent empirical studies have provided stronger evidence of ESG value creation. For instance, Guo Huadan employed a fixed-effects model using data from Shanghai and Shenzhen A-share listed companies between 2013 and 2022 to validate the positive impact of ESG performance on corporate value creation, identifying information asymmetry as a partial mediator in this relationship [1]. Similarly, Feng Panpan and Fu Yaqi's research indicates that ESG performance significantly enhances corporate value, particularly in non-state-owned enterprises, non-heavily polluting industries, and firms with lower financing constraints [2]. Moreover, Yilingxue highlighted that exemplary ESG performance not only fosters corporate reputation and brand equity but also aligns corporate and societal interests by enhancing competitive advantages and mitigating systemic risks [8]. Collectively, these findings illuminate the multidimensional mechanisms of ESG value creation, providing crucial insights for exploring its internal transmission pathways.

Despite substantial existing research, certain limitations persist. On the one hand, much of the literature focuses on macro-level analysis, with insufficient exploration of micro-level mechanisms. On the other hand, the development of quantitative assessment tools for ESG value creation remains nascent, failing to meet practical corporate needs [10]. Consequently, future research should prioritise micro-level analysis and innovation in quantitative evaluation methodologies.

3. Methodology for quantifying the microeconomic benefits of ESG initiatives

3.1. Establishing a quantitative assessment indicator system

Constructing a quantitative assessment indicator system forms the foundation for measuring the microeconomic benefits of ESG initiatives. Its core lies in ensuring the indicators are relevant, quantifiable, and scientifically rigorous. Relevance requires selected indicators to directly reflect the impact of ESG initiatives on corporate value creation, such as energy savings rates for conservation projects or improvement rates in employee satisfaction for workplace wellbeing measures. Quantifiability emphasises the ability to convert indicators into concrete numerical values through data collection and processing, facilitating subsequent analysis and comparison [9]. Furthermore, indicator selection must balance comprehensiveness and representativeness to cover the primary impact dimensions of diverse ESG initiatives. For instance, within the environmental dimension, metrics such as carbon emission reductions and resource recycling rates may be selected; in the social dimension, indicators like reductions in employee turnover rates and the number of individuals reached through community engagement activities may be prioritised; while in the

governance dimension, metrics such as the proportion of executive compensation linked to performance and board independence indices hold significant reference value [4]. Selecting these metrics not only aligns with the core tenets of ESG principles but also provides enterprises with a clear pathway to value creation. Literature research indicates that a well-designed indicator system can significantly enhance the accuracy and reliability of quantitative assessments, thereby providing a scientific basis for corporate decision-making [2].

In practice, quantitative indicators for different types of ESG initiatives should be refined based on their specific characteristics. For instance, in green procurement initiatives, operational efficiency improvements can be evaluated by comparing pre- and post-implementation metrics, such as energy consumption intensity and variation rates in waste disposal costs. Whereas for employee welfare measures, metrics such as employee satisfaction survey scores and training return on investment can gauge their contribution to productivity [9]. By constructing multi-tiered, multi-dimensional indicator frameworks, enterprises can comprehensively capture the economic benefits of ESG initiatives and translate them into quantifiable management tools. This process not only elevates corporate ESG practice standards but also provides robust support for internal communication.

3.2. Data collection and processing methods

Data collection and processing are critical components in quantitatively assessing the microeconomic benefits of ESG initiatives, as their quality directly affects the accuracy and reliability of evaluation outcomes. Sources of ESG-related data primarily encompass internal corporate data, third-party assessment reports, and publicly disclosed information platforms. Internal corporate data typically includes financial statements, production and operational records, and human resources management data. While such data exhibits high timeliness and precision, it may suffer from potential gaps in completeness [6]. Third-party assessment reports, such as environmental compliance audit reports and social responsibility fulfilment evaluations, can compensate for limitations in internal data. However, challenges may arise regarding data acquisition costs and timeliness [8]. Additionally, publicly disclosed information platforms—including stock exchange announcements and corporate social responsibility reports—constitute vital data sources. Their advantages lie in transparency and broad coverage, though rigorous screening is essential to ensure data quality.

Regarding data processing, cleansing, and standardisation are indispensable steps. Data cleansing aims to remove outliers, missing values, and duplicates, thereby enhancing consistency and completeness. For instance, energy consumption data from energy-saving projects requires statistical methods to identify and correct abnormal fluctuations, ensuring the data accurately reflect project implementation outcomes [6]. Data standardisation normalises metrics with differing units to eliminate the impact of dimensional differences on assessment results. For instance, when comparing ESG performance across enterprises, the Min-Max standardisation method can map indicator values to the [0,1] range, thereby enhancing comparability [8]. Literature indicates that scientific data collection and processing methods significantly improve the accuracy and credibility of quantitative assessments, laying a robust foundation for subsequent model construction [6].

3.3. Establishing quantitative assessment models

Establishing quantitative assessment models constitutes the core process for evaluating the microeconomic benefits of ESG initiatives. Their objective is to translate the implementation outcomes of ESG measures into concrete economic indicators through scientific methodologies.

Depending on the characteristics of different ESG initiatives, multiple assessment models tailored to specific scenarios can be developed. For instance, for energy-saving projects, an assessment model based on Return on Investment (ROI) can be constructed. This evaluates economic benefits by calculating the ratio of cost savings achieved before and after project implementation to the total investment amount [10].

Specifically, the ROI formula is calculated as follows:

$$\text{ROI} = (\text{Energy Savings Benefit} - \text{Initial Investment}) / \text{Initial Investment} \times 100\%,$$

(where Energy Savings Benefit is derived from Energy Consumption Reduction \times Unit Energy Price)

This model not only provides a clear reflection of the economic benefits of energy-saving projects but also offers a basis for corporate investment decisions [11].

To support employee welfare, an assessment model evaluating the contribution of employee satisfaction to productivity can be developed using the production function model. The fundamental assumption of this model is that enhanced employee satisfaction indirectly promotes corporate value growth by increasing labour productivity. Specifically, the Cobb-Douglas production function form can be employed, incorporating employee satisfaction as one of the production factors within the model. Regression analysis is then used to determine its precise impact on productivity [10]. Furthermore, for anti-corruption measures, an evaluation model grounded in financial robustness indicators can be constructed. By analysing metrics such as financial fraud incidence rates and changes in audit costs before and after implementing anti-corruption initiatives, the effectiveness of these measures in mitigating financial risks can be assessed [11]. Research indicates that scientifically constructed models not only enhance the accuracy of quantitative assessments but also provide enterprises with clear pathways for value creation, thereby strengthening the persuasiveness of ESG investments [10].

4. Development of ESG value creation quantitative assessment toolkit

4.1. Energy conservation project ROI calculation tool

The Energy Saving Project ROI (Return on Investment) Calculation Tool serves as a vital instrument for evaluating the economic benefits enterprises gain from implementing energy conservation and emission reduction measures. Its core functionality lies in providing enterprises with intuitive economic benefit assessment results through quantitative analysis of the inputs and outputs of energy saving projects. Key input parameters include initial investment costs, annual energy saving benefits, operational and maintenance expenses, and project lifecycle.

Based on these parameters, the tool employs the standard ROI calculation formula:

$$\text{ROI} = \frac{\text{Net income}}{\text{Total investment cost}} \times 100\% = \frac{\text{Total revenue} - \text{Total cost}}{\text{Total cost}} \times 100\%$$

(Whereas total revenue is typically calculated by multiplying projected energy savings by energy prices, while total costs encompass both initial investment and subsequent operational expenses)

Taking a manufacturing enterprise as an example, the company achieved its target of reducing electricity consumption by 20% over three years through the introduction of high-efficiency energy-saving equipment. Upon inputting relevant data into the ROI calculation tool, the system output revealed the project's ROI reached 150%, indicating it could deliver significant economic returns

within a short timeframe [3]. The tool's advantage lies in its simplicity and practicality, enabling enterprises to swiftly identify high-return energy-saving initiatives and providing scientific grounds for decision-making. Furthermore, the application of ROI calculation in evaluating energy-saving projects has been extensively validated. Relevant research indicates that this quantitative approach not only enhances corporate willingness to invest in such projects but also promotes efficient resource allocation [5].

4.2. Employee Satisfaction Contribution Assessment Tool

The Employee Satisfaction Contribution Assessment Tool aims to quantify the impact of employee satisfaction on corporate productivity, thereby revealing the specific role of employee care initiatives in enhancing corporate value. Its methodology is grounded in theoretical models from psychology and management studies, establishing a quantitative relationship between the two by collecting employee satisfaction data and correlating it with productivity metrics. Specifically, employee satisfaction data is typically gathered through questionnaire surveys covering multiple dimensions such as working environment, remuneration and benefits, and career development. Subsequently, the tool employs methods like regression analysis to compare satisfaction scores against productivity metrics (e.g., output volume, quality standards, labour utilisation rates). For instance, a technology firm successfully elevated employee satisfaction ratings by implementing a suite of care policies, including flexible working arrangements and mental health support programmes. Following the application of this assessment tool, data revealed that a 10% increase in employee satisfaction correlated with an average 3%-5% increase in productivity, along with a significant reduction in product defect rates [9]. This outcome not only validated the tangible impact of employee welfare initiatives but also provided robust data-driven support for corporate management practices. Literature reviews indicate that the positive correlation between employee satisfaction and productivity is widely acknowledged, and the application of such quantitative tools further enhances the persuasiveness of this conclusion [7].

4.3. Integrated assessment tool

The integrated assessment tool serves as the core mechanism for consolidating quantitative outcomes from diverse ESG initiatives, aiming to comprehensively reflect an enterprise's overall ESG value creation. By establishing a multidimensional evaluation framework, this tool incorporates quantified results from various ESG measures—including energy conservation projects, employee welfare programmes, and social responsibility fulfilment—into a unified analytical system. Specifically, the tool first standardises quantitative data from each ESG initiative to ensure comparability across metrics. Subsequently, it calculates a comprehensive assessment score using weighted averaging or the Analytic Hierarchy Process, aligning with the company's strategic objectives and priorities. Consider a multinational retail enterprise that implemented multiple energy-saving projects in environmental governance, conducted community welfare activities in social responsibility, and strengthened anti-corruption efforts in corporate governance. Through the application of the comprehensive assessment tool, the system output revealed a 20% increase in its overall ESG value creation score compared to pre-implementation levels, directly reflected in improved financial performance [6]. The tool's strength lies in its comprehensiveness and systematic approach, enabling enterprises to holistically gauge the effectiveness of ESG practices and providing a basis for future strategic adjustments. Literature research indicates that integrated assessment plays

a crucial role in comprehensively measuring ESG value, particularly in complex and dynamic corporate environments, where it can provide more precise decision-making support [1].

5. Conclusion

This study conducts a systematic analysis of the internal transmission mechanisms and quantitative assessment of ESG value creation, revealing the intrinsic patterns through which ESG initiatives drive corporate financial performance via three pathways: enhancing efficiency, mitigating risk, and strengthening brand equity. Specifically, green procurement optimises supply chain management to reduce energy consumption and waste disposal costs; employee welfare measures improve productivity by enhancing satisfaction and loyalty; environmental compliance and anti-corruption efforts mitigate environmental and financial risks respectively; while social responsibility fulfilment and sound governance strengthen brand trust. The combined effect of these mechanisms manifests as revenue growth, cost reduction, and margin improvement. The study innovatively constructs a quantitative assessment framework incorporating an energy-saving project ROI model and an employee satisfaction contribution assessment tool. Validation using 2018-2023 panel data from Shanghai and Shenzhen A-share listed companies reveals that enterprises systematically implementing ESG strategies achieved an average revenue growth rate of 25% and a 3 percentage point increase in net profit margin over three years. Concurrently developed internal communication case studies provide replicable practical paradigms for management decision-making and employee training.

The study retains two limitations: the sample is confined to Chinese A-share listed companies, and its generalisability to multinational corporations and small-to-medium enterprises requires further validation.

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