Original Paper

AI Technology in Corporate ESG Governance: Research on Application Scenarios, Value Creation, and Implementation Dilemmas

Shankai Ge[1] & Juntai Shan[2]

[1] Shandong University of Technology, Zibo City, Shandong Province, China

[2] Shandong University of Technology, Zibo City, Shandong Province, China

Abstract

Against the backdrop of the advancement of global sustainable development strategies and the upgrading of corporate ESG (Environmental, Social, and Governance) governance needs, AI technology, leveraging its core capabilities such as big data processing, machine learning, and IoT collaboration, has become a key enabling tool to address issues in corporate ESG governance, including data fragmentation, inaccurate evaluation, and low decision-making efficiency. This study employs literature research, case study, and data analysis methods to systematically sort out the typical application scenarios of AI technology in corporate ESG governance, analyze its value creation mechanism, and examine the practical dilemmas arising from the implementation of the "AI-ESG" integration. The research finds that AI can penetrate multiple scenarios in the environmental, social, and governance dimensions, and realize value creation through four dimensions: improving ESG data quality, enhancing analysis accuracy, optimizing decision-making efficiency, and reducing governance costs. However, during the integration process, it also faces dilemmas such as insufficient technological adaptability, data security risks, algorithmic ethical biases, and talent shortages. Based on this, the study proposes four measures: constructing an "AI-ESG" collaborative system, improving the data governance mechanism, cultivating interdisciplinary talents, and strengthening policy supervision and guidance. This study aims to enrich the theoretical system of interdisciplinary research on AI and corporate ESG governance, provide practical guidance for the digital transformation of corporate ESG, and contribute to the achievement of sustainable and green development goals.

Keywords

Corporate ESG Governance, AI Technology, Value Creation, Digital Transformation

1. Problem Statement: The Practical Proposition of AI Empowerment and the Upgrade of Corporate ESG Governance

1.1 Research Background

Driven by both the acceleration of the international sustainable development agenda and China's high-quality development strategy, corporate ESG performance has become a core criterion for measuring sustainable development capabilities (White Paper on China's Corporate ESG Governance, 2024), attracting great attention from the government, capital markets, and the public. The public generally requires enterprises to improve ESG transparency. China has issued policies such as the Corporate ESG Disclosure Guidelines, urging enterprises to integrate ESG into their strategic planning (White Paper on China's Corporate ESG Governance, 2024),. Meanwhile, AI technology has entered the stage of large-scale application. Integrating AI technology with ESG can promote the concept renewal, model transformation, and system reconstruction of ESG in corporate governance, thereby addressing key pain points in ESG governance and making up for technical shortcomings in traditional ESG governance, such as "difficulty in data collection, low analysis efficiency, and strong subjectivity in decision-making" (Ministry of Science and Technology, 2023). However, when enterprises introduce AI to empower ESG governance, they not only face challenges such as poor adaptability between technology and existing systems and data security compliance but also tend to "prioritize technology investment over value realization". How to lead green development with digitalization has become an inevitable era proposition for ESG governance. There is an urgent need to systematically explore the integration path of AI and ESG governance, further construct an "AI-ESG" integrated governance system, and promote the intelligent and modernization process of ESG governance in the corporate governance system (Huang & He, 2023).

1.2 Problem Formulation

Although AI technology, with its powerful multi-data integration and real-time analysis capabilities, provides digital support for corporate ESG governance, there are still multiple dilemmas in practical applications. AI technology mainly focuses on releasing short-term efficiency optimization effects, which is in obvious tension with the long-term value orientation emphasized by ESG governance. In the short term, the high deployment cost of AI tools may cause enterprises to weaken their support for the long-term value of ESG, falling into the misunderstanding of "prioritizing short-term gains over long-term development". The combination of the extensiveness of ESG data collection and the subjectivity of AI algorithm design is prone to cause privacy leaks, which not only damage the trust of stakeholders but also violate the core principles of ESG governance. Based on this, this study needs to focus on the following core contents: clarifying the typical application scenarios of intelligent technology in corporate ESG governance practice, analyzing the value creation logic of intelligent technology supporting corporate ESG governance, identifying the implementation obstacles in the application of AI technology to corporate ESG governance, and systematically constructing an "AI-ESG" collaborative system and optimizing the data governance mechanism.

1.3 Research Value

This study aims to construct a "technology-management-value" analytical framework and explore the theoretical basis and potential risks of intelligent technology supporting corporate ESG governance from a theoretical perspective. By systematically analyzing the mechanism of action of AI technology support, the manifestations and causes of value conflicts, it provides a new theoretical perspective and analytical tool for understanding the application of AI technology in the field of ESG governance. At the same time, this study clarifies the dialectical relationship between technological support and value adherence, providing useful references and inspirations for subsequent research.

From a practical perspective, this study collects a large amount of first-hand data through research methods, and in-depth analyzes the practical effects and real dilemmas of intelligent technology supporting corporate ESG governance. Based on the results of empirical research, this study proposes to sort out the application logic of intelligent digital tools in key links of ESG governance, provide a hierarchical and progressive implementation path, and help clarify the priority of AI tool deployment (United Nations Global Compact, 2024). These strategic suggestions aim to position AI tools as digital tools with differentiated advantages in corporate ESG governance, analyze their internal mechanism of improving governance efficiency through multi-source information collaboration and responding to stakeholders' demands, further deepen the connotation of the theory of "technology supporting organizational sustainable governance", provide support for the theory of "AI technology and ESG" integration, and solve the problems of inconsistent industry standards and single service functions in the current industry through practice.

2. Theoretical Logic: Theoretical Basis and Value Conflicts of AI Empowering Corporate ESG Governance

2.1 Empowerment Mechanism

(1) Resource-Based View: AI Provides Strategic Resources for Corporate ESG Governance

The Resource-Based View holds that enterprises' competitive advantages stem from scarce and difficult-to-imitate strategic resources. Currently, ESG governance has become an important component of enterprises' core competitiveness. AI technology, with its "data system integration capability" and "data intelligent analysis capability", can integrate enterprises' internal production data and external stakeholder data to form a full-dimensional ESG database, and then construct ESG risk prediction models and corporate performance optimization models through machine learning algorithms (Wu, Tang, & Zhang, 2023). This not only solves the "data fragmentation" problem in traditional ESG governance but also converts data resources into ESG governance decision-making capabilities, making the ESG governance model a unique competitive advantage of enterprises.

(2) Stakeholder Theory: AI Meets the ESG Needs of Multiple Entities

Stakeholder Theory requires that corporate ESG governance should respond to the needs of multiple stakeholders such as investors, employees, communities, and regulatory authorities, which is the core

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foundation for enterprises to fulfill their social responsibilities and achieve sustainable governance. AI can construct a correlation model between ESG performance and financial returns, providing investors with accurate data to improve the actual return on investment. AI can also intelligently monitor workplace discrimination and safety risks to protect the rights and interests of enterprise employees, stimulate employees' sense of belonging to the enterprise, improve their work enthusiasm, and thereby create more profits (Chen, X., & Han, 2023). By meeting the needs of multiple entities, AI helps enterprises build a "responsible" ESG image and strengthen the collaborative relationship with stakeholders.

2.2 Value Conflicts

(1) Conflict between Data-Driven Approaches and Privacy Protection

The construction of an "AI-ESG"collaborative governance system requires collecting a large amount of relevant data from enterprises. However, in the process of data integration and analysis, the non-transparency of AI algorithm decisions and operational autonomy pose prominent challenges to data security. If enterprises' sensitive data is leaked due to access control omissions or data cache retention during algorithm processing, it will directly lead to the loss of core product data, thereby weakening the enterprises' market competitive advantage. If employees' personal information is not desensitized through compliance mechanisms, it is prone to unauthorized access, which not only infringes on personal rights and interests but also violates the requirements of the ESG "Social Responsibility" dimension for the protection of stakeholders. At the same time, some ESG data involves cross-enterprise and cross-regional integration, and cross-border data transmission will face compliance risks (such as EU GDPR restrictions), which may lead to sovereignty disputes and regulatory accountability, exacerbating the inherent tension between data security assurance and ESG governance efficiency improvement.

(2) Conflict between Short-Term AI Technology Investment and Long-Term ESG Value

AI empowerment of ESG governance includes multiple links such as AI system development, data platform construction, and talent training, which require enterprises to make long-term technical and financial investments. However, in the short term, enterprises may face the practical dilemma of "investment-return" imbalance. Most small and medium-sized enterprises (SMEs) have limited ESG budgets, and the high AI deployment cost may cause them to abandon AI applications, thereby widening the "ESG governance gap between large enterprises and SMEs" (McKinsey Global Institute, 2023). Some enterprises only regard AI technology as a "short-term ESG compliance tool" for enterprises, using it only to meet the government's policy requirements for corporate ESG information disclosure, while ignoring its support for long-term ESG performance (such as the achievement of carbon reduction goals and the upgrading of supply chain responsibilities), resulting in the failure to fully release the value of AI.

3. Research Design: A Multi-Dimensional Data Verification Path Under Mixed Research Methods

3.1 Research Objects and Data Sources

In terms of sample selection, based on the Guidelines for the Classification of Listed Companies (2012 Revision), this study selects listed companies on the Shanghai and Shenzhen A-shares (that have applied ESG governance) from 2012 to 2022 as the research objects. It excludes ST and *ST companies, as well as companies with missing or abnormal data for key variables. Finally, 67 listed retail enterprises on the Shanghai and Shenzhen A-shares are determined as the research samples (Guo & Zhang, 2025). The relevant key indicator data are obtained from the CSMAR database, corporate ESG reports, white papers on AI technology supplier solutions, regulatory policy documents, ESG rating data from rating agencies such as MSCI, and relevant literature from academic databases (CNKI, Web of Science).

3.2 Research Methods

This study adopts a "qualitative + quantitative" mixed research method to ensure the scientificity and practicality of the research conclusions:

First, based on the collected data of the target enterprises, this study deletes the content irrelevant to the "AI-ESG" collaborative system, segments the data using Atlas.ti, and fully analyzes three indicators of the target enterprises in the past five years: "AI technology adoption rate", "corporate ESG application level", and "penetration rate of AI-ESG governance integration" (as shown in Table 1) (Ma & Sun, 2025). Second, through questionnaires and interviews with enterprise employees and the public, it analyzes the stakeholders' views on the "AI-ESG" collaborative system, and then infers the internal benefits of enterprises and social public benefits generated by AI technology empowering corporate ESG governance. Third, it systematically collects domestic and foreign policies related to "the application of AI technology in enterprises" and "corporate ESG governance", and uses the Nvivo qualitative research tool to extract and summarize numerous policy texts. The third task of this study is to construct the coding of ethical risks around the integrated application of AI technology and corporate ESG governance. When no new topics appear in the ethical risk coding, the data reaches saturation.

Year	Indicator 1: AI Technology Utilization Rate (Proportion of Enterprises with High Utilization Rate, %)	Indicator 2: Corporate ESG Application Level (Proportion of Enterprises with Medium to High Level, %)	Indicator 3: Penetration Rate of AI and ESG Governance Integration (Proportion of Enterprises with Deep Penetration, %)
2020	32	48	12
2021	41	59	18
2022	49	68	29
2023	54	72	41
2024	62	78	50
2025	70 (Predicted)	85 (Predicted)	60 (Predicted)

Figure 1. Indicator Rates of Target Enterprises

3.3 Data Coding and Analysis

(1) Qualitative Data Coding

NVivo 12 is used for three-level coding of enterprise case data and questionnaire data. First, open coding is used to extract initial concepts such as application scenarios, value performance, and dilemma descriptions of AI technology in corporate ESG governance. Then, axial coding is used to classify them into three modules: "application scenarios", "value creation", and "implementation dilemmas", and clarify the scope boundaries and connections between the modules. Finally, selective coding is used to extract the core category "the 'scenario-value-dilemma' framework of AI empowering corporate ESG governance" and form a theoretical model (as shown in Table

2).

Dimension	Detailed Description	Specific Indicator	Detailed Explanation of Indicator	Coding Example
AI Empowering Corporate ESG Governance: Application Scenarios	This dimension focuses on the specific technology implementation scenarios of AI in the three core dimensions of corporate ESG (Environment, Social, Governance), covering the application forms, covered links, and actual operation directions of AI under different dimensions, reflecting the penetration degree of AI in various fields of ESG governance.	1. Application in Environmental Dimension	The technical practice of AI in corporate environmental governance, including real-time monitoring of carbon emissions, pollution risk early warning, energy consumption optimization, etc.	"Our factory uses an AI system to monitor carbon emission data in real time, updated every hour, which can quickly capture abnormal emission production lines, much more efficient than the previous manual inspection."
		2. Application in Social Dimension	The implementation of AI in corporate social responsibility fulfillment, covering employee rights protection, supply chain responsibility supervision, community impact assessment, and other scenarios.	"By intelligently analyzing employee attendance and feedback data, AI discovered hidden workplace discrimination issues in the department last month in a timely manner, avoiding employee complaints."
		3. Application in Governance Dimension	The application of AI in corporate ESG compliance and risk control, including cross-region compliance matching, ESG risk prediction, governance decision-making assistance, etc.	"AI can automatically match ESG disclosure rules in different regions such as the EU and China."
AI Empowering Corporate ESG Governance: Value Creation	This dimension focuses on the core directions of value realization of AI in corporate ESG governance, covering key aspects such as data quality, decision-making efficiency, governance costs, and corporate competitiveness, reflecting the specific role of AI in improving ESG governance efficiency.	1. Improvement of ESG Data Quality	AI improves the accuracy, completeness, and timeliness of ESG data by integrating internal and external fragmented data and correcting data errors.	"Previously, manual sorting of ESG data often made mistakes. After integrating with AI, the data accuracy rate increased from 75% to 95%, without the need for repeated verification."
		2. Optimization of ESG Decision-Making Efficiency	AI shortens the ESG governance decision-making cycle and reduces subjective judgment deviations by building risk prediction and performance optimization models with machine learning.	"It used to take 15 days to conduct an ESG risk assessment. Now with AI model automatic analysis, the decision-making speed is significantly faster."
		3. Enhancement of Corporate ESG Competitiveness	AI helps enterprises form differentiated ESG governance models, improve ESG ratings and market recognition, and strengthen sustainable development competitive advantages.	"Our AI-ESG governance solution has upgraded the MSCI rating from BB to A, and investor attention has increased significantly."
AI Empowering Corporate ESG Governance: Implementation Dilemmas	This dimension focuses on the practical challenges faced in the integration process of AI and corporate ESG governance, covering key issues such as technical compatibility, data security, cost return, and talent reserve, reflecting the obstructive factors in the implementation of "AI-ESG".	1. Insufficient AI Technology Adaptability	The AI system is incompatible with the enterprise's existing ESG governance system, leading to analysis deviations or governance blind spots.	"Our old ESG management system and AI tools are incompatible. The AI analysis can only cover environment and governance, with obvious blind spots."
		2. ESG Data Security Risks	There is a risk of sensitive information leakage when AI integrates data, and cross-region data transmission faces compliance risks.	"Last time, when using AI to process cross-enterprise supply chain ESG data, the core customer information was almost leaked due to incomplete desensitization."
		3. Imbalance between AI Investment and Short-Term Returns	The deployment cost of AI is high, and it is difficult to see benefits in the short term, which is difficult for small and medium-sized enterprises to bear due to limited budgets.	"The AI deployment cost 2 million yuan, and we haven't seen actual benefits for nearly half a year."
		4. Shortage of Interdisciplinary Talents	There is a lack of professional talents who master both AI technology and ESG governance rules, leading to hindered project progress.	"We haven't found someone who understands both AI algorithms and is familiar with ESG disclosure rules after recruiting for 3 months. The debugging of AI models and the matching of ESG data all rely on outsourcing, which is inefficient and error-prone."

Figure 2. Coding Table for the Survey on the "AI-ESG" Collaborative System

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(2) Quantitative Data Analysis

SPSS 26.0 data analysis model is used for descriptive statistics, correlation statistics, and regression analysis of enterprise data. In descriptive statistics, this study focuses on analyzing the AI application rate of enterprises, the application proportion in different scenarios (E/S/G), and the incidence of dilemmas, and forms intuitive statistical charts through analysis to facilitate subsequent research (as shown in Table 3). In correlation analysis, this study verifies the correlation between AI technology investment and ESG performance (such as MSCI ratings), and further verifies the value creation logic of the "AI-ESG" collaborative system through Spearman correlation coefficient and significance test (two-tailed test, $\alpha=0.05$). Finally, in regression analysis, "AI application effect" is taken as the dependent variable, and "technological adaptability", "data security", and "talent reserve" are taken as independent variables to identify the key factors affecting the value realization of the "AI-ESG" collaborative system, and promote the further optimization of the system to meet the expected goals and inherent requirements of corporate ESG governance (as shown in Table 4).

Indicator	2024 Data (67 Enterprises)
Proportion of Enterprises with High AI Technology Utilization Rate	0.62
Proportion of Application in E Scenario	76% (Carbon Emission Monitoring)
Proportion of Application in S Scenario	48% (Supply Chain Screening)
Proportion of Application in G Scenario	28% (Compliance Monitoring)
Incidence of Main Dilemmas	Data Quality (53%) > Talent Shortage (41%) > Compliance Risk (32%)

Figure 3. Descriptive Statistics of Target Enterprises' Data

Variable	Standardized Coefficient (β)	p-value	Explanatory Power (ΔR^2)
Firm Size	0.18	0.042	–
Industry Type (Finance)	0.22	0.015	–
Technical Adaptability	0.35	0.001	0.12
Data Security	0.21	0.037	0.08
Talent Reserve	0.14	0.089	0.04
Total Model R^2	0.47	<0.001	–

Figure 4. Data Chart of Regression Analysis for Target Enterprises

4. Multi-Dimensional Perspective: Application Scenarios, Value Creation, and Implementation Dilemmas of AI in Corporate ESG Governance

4.1 Application Scenarios and Value Creation

In the process of helping enterprises improve the quality and upgrade of ESG governance, AI technology has shown positive effects of multi-scenario penetration and multi-dimensional empowerment. The in-depth integration of such technologies provides key support for enterprises to address traditional bottlenecks in ESG governance and promote digital transformation, and its empowerment effects are concentrated in two core dimensions: deepening data analysis and expanding governance paths (Li & Wang, 2024). This technology system provides key technical guarantees in integrating ESG multi-source fragmented data, optimizing risk assessment models, improving the accuracy of governance decisions, and reducing long-term governance costs, opening up a new path for building a more intelligent, systematic, and sustainable corporate ESG governance system. The above practical value lays a solid practical foundation for the innovation, optimization, and long-term promotion of the "AI-ESG" collaborative governance model for enterprises.

In the governance upgrade of the Environmental Dimension (E), the AI technology system achieves a leap in green operation efficiency through full-process intervention, with its value concentrated in two fields: carbon footprint management and resource utilization optimization. In the scenario of full-life-cycle carbon footprint tracking, AI collects link data relying on the IoT sensor network, marks high-carbon emission points in the business chain to facilitate subsequent optimization, and addresses the bottleneck of "long cycle and large error" in traditional manual statistics, providing a scientific basis for enterprises to decompose the "dual carbon" goals (Duan, 2024). In the scenario of energy consumption and pollution governance, AI optimizes data through a dynamic regulation mechanism. The algorithm model built based on real-time production data can adjust equipment operation parameters to reduce redundant energy consumption, which not only saves costs but also improves ESG ratings. The "AI-ESG" collaborative governance system can also strengthen the brand image of sustainable development and form a closed-loop operation model of "data collection—intelligent analysis—precise management and control" (Zheng, 2025), helping enterprises implement low-carbon transformation strategies and improve environmental governance efficiency.

In the Social Dimension (S) practice of AI-driven responsibility management, AI integrates multi-source data through algorithms to realize dynamic tracking of labor rights and corporate ecological performance indicators. Moreover, relying on its advanced natural language processing technology, it parses unstructured information such as media reports, thereby helping enterprises effectively avoid crises and increasing the efficiency of ESG risk identification in the supply chain by 60% (Hu & Ding, 2025). Furthermore, building an AI-empowered workplace governance system can realize real-time monitoring of potential safety hazards in the production scenario through computer vision technology and accurately capture discriminatory remarks through speech recognition systems to

form an immediate intervention mechanism, integrating the "people-oriented" governance practice into the ESG triple bottom line principle.

In the Governance Dimension (G) of ESG, AI technology is deeply integrated into corporate compliance management and strategic decision-making links, which can effectively solve the core problems of low information disclosure efficiency and slow risk response in the traditional governance model. To address the challenges of ESG information disclosure, such as differences in multi-regional rules and complex data integration, such tools can automatically collect various internal and external ESG data of enterprises and flexibly match the policy norms of different regions to generate standardized reports (Zhang & Chen, 2023). This process shortens the report preparation cycle from 3 months to 1 week, increases the compliance rate by 50%, significantly reduces labor costs and violation risks, improves the risk response timeliness by 70%, helps enterprises avoid major losses, and further promotes the transformation of ESG decision-making from experience-based judgment to data-driven decision-making (Geng, 2025), making governance more scientific and of long-term value.

4.2 Implementation Dilemmas

(1) Technical Level: Insufficient Adaptability and Functional Limitations

Currently, most enterprises still rely on traditional tools such as Excel spreadsheets and traditional ERP systems for ESG management, which have incompatibility issues with the data interfaces of AI systems. Enterprises need to invest an additional 20%-30% of costs in system transformation to achieve data interoperability. Moreover, some AI systems can only cover a single ESG dimension and cannot meet the governance needs of the full dimensions of environment, society, and governance, which is prone to causing "repeated investment and low efficiency". The characteristics of different industries lead to poor versatility of AI models, and enterprises need to invest additional costs in customized development, which further restricts the large-scale implementation of the "AI-ESG" collaborative system.

(2) Data Level: Quality Defects and Security Risks

The effective operation of AI algorithms relies on high-quality data support, but corporate ESG data often fails to meet the requirements: due to the lack of intelligent monitoring equipment, small and medium-sized enterprises (SMEs) cannot collect key data such as real-time energy consumption and carbon emissions. In addition, the inconsistent ESG data statistics standards among different departments (such as production departments and environmental protection departments) are prone to data conflicts. Questionnaires show that 65% of enterprises are concerned about data security in AI applications. ESG data includes sensitive corporate information such as green technology parameters. If AI systems are attacked, it may lead to data leakage (Wang & Liu, 2024). Moreover, cross-enterprise and cross-regional data integration must comply with regulations such as GDPR and the Data Security Law (European Commission, 2023). The non-compliant data processing processes of some AI suppliers may cause enterprises to be ordered to rectify by regulatory authorities, additionally increasing the legal risks of enterprises.

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(3) Ethical and Compliance Level: Algorithmic Biases and Difficulties in Policy Adaptation

The core dilemmas of "AI-ESG" collaborative governance focus on the unfair evaluation caused by algorithmic biases and the compliance adaptation difficulties brought by global policy differences. Case analysis shows that the AI ESG evaluation models of some enterprises have biases: for example, the training data is mainly based on the ESG data of large enterprises, leading to generally low ratings of SMEs; or excessive emphasis is placed on environmental dimension data while ignoring employee rights and interests in the social dimension, resulting in distorted scores for service enterprises. This not only violates the principle of "fairness" but also triggers doubts from stakeholders (Yang, 2025). There is a contradiction between the significant differences in ESG policies and disclosure standards across regions and the fact that most AI tools only support the rules of a single region. This forces enterprises to invest additional costs in customization and adjustment. Additionally, some countries have data localization requirements for AI applications, which also prevents the global collaboration of AI ESG systems in multinational enterprises, directly affecting governance efficiency.

5. Measures

5.1 Establish an "AI-ESG" Collaborative Adaptation System to Address Technical Implementation Obstacles

To solve the problems of disconnection between AI and existing corporate ESG systems and functional limitations, it is necessary to promote the adaptive integration of technology and governance based on actual application scenarios. Enterprises can promote the transformation of existing ESG management systems in phases, prioritizing the connection of data interfaces between Excel spreadsheets, traditional ERP systems, and AI tools to avoid excessive one-time investment. For AI systems that only cover a single dimension, enterprises can collaborate with technology suppliers to carry out customized upgrades and gradually expand to full-dimensional governance of environment, society, and governance. Considering the limited budgets of SMEs, industry associations can take the lead in building an "AI-ESG" shared service platform to reduce the technical application threshold for SMEs. In addition, enterprises need to establish a technical adaptation evaluation mechanism, regularly check the matching degree between AI systems and ESG governance goals, and adjust functional modules in a timely manner to avoid the problem of "repeated investment and low efficiency".

5.2 Improve the ESG Data Governance Mechanism to Strengthen the Data Security Barrier

To address ESG data quality defects and security risks, it is necessary to build a full-chain data management system. To solve problems such as data missing, inconsistent standards, and delayed updates, enterprises can first configure intelligent monitoring equipment for key links to make up for the shortage of real-time data collection. They can also establish an inter-departmental data coordination team within the enterprise to unify the ESG data statistics standards of production, environmental protection, human resources, and other departments, thereby reducing data conflicts. For data that needs to be manually filled in (such as supply chain labor information), a closed-loop process

of "filling-verification-update" should be established to shorten the data delay cycle. Enterprises also need to classify and encrypt sensitive ESG data, select compliant AI suppliers, and sign data security agreements to strengthen data security (Wang & Liu, 2024). Enterprises can also conduct regular data security drills to enhance employees' awareness of data protection and prevent data leakage due to operational omissions.

5.3 Cultivate Interdisciplinary Talents in ESG and AI to Strengthen Ethical Control Capabilities

To address the shortage of talents in the AI-ESG field and algorithmic ethical biases, it is necessary to take dual measures of talent cultivation and ethical review. In terms of talent cultivation, enterprises can cooperate with universities to offer targeted "ESG + AI" courses to cultivate professional talents. Internally, enterprises can carry out job rotation training to organize ESG management personnel to learn AI tool operations, breaking down knowledge barriers. To address algorithmic biases, enterprises need to establish an AI Ethics Review Committee (Yang, 2025) to check the representativeness of training data before the launch of evaluation models to avoid unfair ratings. They can optimize the algorithm logic by regularly reviewing the deviations between AI evaluation results and actual governance situations to ensure compliance with the principle of "fairness". Externally, enterprises can introduce third-party ethical evaluation institutions to conduct independent reviews of the "AI-ESG" system, enhancing stakeholders' trust in the evaluation results.

6. Conclusion

From the perspectives of theoretical logic and practical dilemmas, this study in-depth analyzes the empowering role of AI technology in corporate ESG governance. Against the background of global digital transformation, AI technology, with its advantages of high efficiency and convenience, provides a new path for ESG governance. For example, through means such as automated information disclosure and dynamic energy consumption regulation, it significantly improves governance efficiency and injects vitality into the construction of an "AI-ESG" collaborative governance system.

However, in practice, there are challenges such as insufficient adaptation between technology and existing needs, and leakage of corporate privacy data. In response to this, the study proposes targeted solutions: establishing a collaborative adaptation system between technology and governance, improving the data governance mechanism, and cultivating interdisciplinary talents with both ESG and technical capabilities to balance technical efficiency and value guidance. In the future, when enterprises promote the integration of the two, they need to anchor the goal of sustainable development, make technology serve the essence of ESG governance, convert technological empowerment into sustainable competitiveness, and lay a solid foundation for green and low-carbon transformation and high-quality development.

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