

# ESG Practices and Evaluation Indicator System Construction for Baijiu Enterprises under the Dual Carbon Goals

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## Abstract

Guided by the "Dual Carbon" strategic goals, this study focuses on the ESG practices of Baijiu enterprises. By synthesizing literature reviews and industry practices, an industry-specific ESG evaluation indicator system is constructed. The research deconstructs the unique ESG practices of the Baijiu industry in areas such as carbon emission reduction, energy consumption, intangible cultural heritage inheritance, and cultural recognition. An evaluation framework is established, comprising 3 first-level indicators, 12 second-level indicators, and 48 third-level indicators, with innovative additions such as "cooling water recycling rate" and "distillers' grains resource utilization rate." The system addresses compatibility between industry-specific characteristics and universal ESG frameworks, emphasizing carbon footprint tracking in production processes, fulfillment of social responsibilities, and preservation of traditional cultural values. The findings provide a tailored assessment tool for the sustainable development of Baijiu enterprises and serve as a reference for ESG standard formulation in both the Baijiu industry and other sectors.

## Keywords

Dual Carbon Goals; Baijiu Enterprises; ESG; Evaluation Indicators.

## 1. Introduction

The alcoholic beverage industry is resource-intensive, involving a long industrial chain from crop cultivation to production and sales. As a traditional sector in China, the Baijiu industry plays a pivotal role in national economic development. It contributes to meeting the growing demand for a better life, driving consumption upgrades, and accelerating the formation of new industrial development patterns, transitioning from "high-speed, extensive growth" to "high-quality, leapfrog development."

ESG (Environmental, Social, and Governance) serves as a core framework for enterprises to fulfill their responsibilities in environmental protection, social welfare, and governance. It leverages market-driven mechanisms to promote low-carbon transformation and sustainable development. Under China's national strategy to achieve "Carbon Peak and Carbon Neutrality," ESG aligns closely with the green transformation and high-quality development of the Baijiu industry. It enhances environmental management, optimizes social contributions, and improves corporate governance structures<sup>[1-3]</sup>.

ESG integrates environmental, social, and governance factors into corporate decision-making and operations, emphasizing value creation beyond financial performance. Recent policies have significantly influenced ESG development in Baijiu enterprises. For instance, the "Water Pollutant Discharge Standards for Fermented Alcohol and Baijiu Industry" established emission limits, driving advancements in production processes and pollution control technologies. The "Guidelines on Further Improving the Quality of Listed Companies" (National Development and Reform Commission, People's Bank of China, and China Securities Regulatory Commission,

October 2021) strengthened corporate governance requirements. The revised “Administrative Measures for Information Disclosure of Listed Companies” introduced new disclosure principles. The “Green Bond Supported Projects Catalogue” (NDRG, PBOC, and CSRC) excluded high-carbon projects, unified standards, reduced financing costs, and facilitated green transitions.<sup>[4-5]</sup>

The “Notice on Issuing Research on ESG Special Report Preparation for Central State-Owned Listed Companies” mandated ESG reporting and third-party verification, enhancing disclosure credibility. The “Corporate Sustainability Disclosure Standards-Basic Standards” provided unified guidelines for ESG disclosure. The “Guidelines for Investor Relations Management of Listed Companies” incorporated ESG into investor communication, elevating its importance in capital markets. Additionally, the “Three-Year Action Plan to Enhance ESG Capabilities of Foreign-Related Enterprises in Shanghai (2024–2026)” encouraged the development of internationally aligned, China-specific ESG standards. These policies collectively drive ESG progress in Baijiu enterprises, fostering sustainable industry development<sup>[6]</sup>.

## 2. ESG Development Theory and Practice

### 2.1. ESG Development Theory

#### 2.1.1. Global Evolution and Localization Process of the ESG Theoretical Framework

In the 1960s–1970s, environmental destruction and labor rights issues caused by industrialization in Western countries triggered public protests, giving rise to environmental movements and early corporate social responsibility (CSR) practices<sup>[7-8]</sup>. The “Declaration of the United Nations Conference on the Human Environment” first incorporated environmental issues into the global agenda. The “Our Common Future” report (1987) introduced the concept of “sustainable development,” forming the embryonic stage of ESG principles. In 1997, the “Statement of Commitment to Sustainable Development” issued by the United Nations Environment Programme Finance Initiative (UNEP FI) proposed integrating environmental and social factors into corporate operations and strategies. In 2004, the United Nations Global Compact (UNGC) formally introduced the ESG concept in its report “Who Cares Wins”. The 2008 global financial crisis accelerated ESG development, prompting governments and regulators worldwide to take action. In China, the Shanghai Stock Exchange released the “Guidelines for Environmental Information Disclosure of Listed Companies” (2008), encouraging listed companies to disclose ESG-related financial information. On April 12, 2024, the Shanghai, Shenzhen, and Guangzhou Stock Exchanges jointly issued the “Guidelines for Sustainability Reports of Listed Companies”, marking the advent of mandatory ESG reporting for Chinese listed companies. Globally, ESG development has evolved from conceptual proposals to practical implementation, transitioning from voluntary initiatives to a global consensus.<sup>[9-15]</sup>

#### 2.1.2. Historical Stages and Characteristics of ESG Practices in the Baijiu Industry

##### (1) Exploration Stage (2008–2015)

Driven by national regulations such as the “Guidelines for Sustainability Reports of Listed Companies” (2008), “Cleaner Production Promotion Law” (2010), “Emission Standards for Water Pollutants in Fermented Alcohol and Baijiu Industries” (2011), and “Air Pollution Prevention and Control Action Plan” (2013), companies were compelled to address pollution control passively. This stage was characterized by high policy pressure (regulatory enforcement) but shallow practical depth (limited to end-of-pipe treatment).

##### (2) Standardization Stage (2016–2020)

The implementation of standardized frameworks, including “GB/T 36000 Guidelines for Social Responsibility” (2015), “ESG Disclosure Guidelines for Baijiu Enterprises” (2017), and “Revised Code of Corporate Governance for Listed Companies” (2018), shifted ESG management from

"spontaneous" to "institutionalized." This stage featured synchronized improvements in policy pressure (standards guidance) and practical depth (whole-industry-chain management).

### (3) Deepening Stage (2021–Present)

Policies such as China's "Dual Carbon" goals (2020), "Development Guidance for China's Liquor Industry During the 14th Five-Year Plan Period" (2021), and "Guidelines for Promoting High-Quality Development of the Baijiu Industry" (2022) required deeper integration of ESG with industrial strategy. This stage is marked by weakened policy pressure (shifted to strategic guidance) and breakthroughs in practical depth, extending to business model innovation<sup>[16-24]</sup>.

### 2.1.3. Synergistic Mechanisms between Dual Carbon Goals and ESG

#### (1) Policy Rigidity Constraints-Driven

Regulations such as the "Emission Standards for Water Pollutants in Fermented Alcohol and Baijiu Industries (2022 Edition)", "Evaluation Specifications for Green Factories in the Baijiu Industry" (2022), and "Measures for Legal Disclosure of Environmental Information"(2022) raised emission and disclosure standards.

#### (2) Economic Incentive Leverage-Driven

The "Green Finance Evaluation Scheme for Banking Institutions"(2023) by the People's Bank of China promoted green financing (G). The "Value-Added Tax Incentive Catalog for Resource Comprehensive Utilization" (2023) offered carbon tax reductions, while the "Low-Carbon Technology Innovation Project for Key Industries" (2022) provided subsidies (E) to stimulate technological innovation.

#### (3) Industrial Chain Synergy-Driven

The "Agricultural and Rural Emission Reduction and Carbon Sequestration Implementation Plan" (2022) subsidized organic farming to achieve upstream agricultural integration. The "14th Five-Year Plan for Circular Economy Development" aimed to valorize waste and develop downstream circular economies.

#### (4) Market Mechanism Pressure-Driven

The "Green Bond Supported Projects Catalog (2023)" included baijiu clean production as eligible for financing, linking ESG ratings to funding access. The "Ecological Design Product Evaluation Specifications" (2023) required carbon footprint labeling for exported products, enforcing carbon certification. The Dual Carbon goals propel ESG development in the baijiu industry through a transmission chain of "policy enforcement (environmental baseline E) → economic incentives (governance upgrade G) → ecological synergy (social value S)."<sup>[25-33]</sup>

## 2.2. ESG Practice

### 2.2.1. Research on Influencing Factors of ESG Development

Scholars generally explore four dimensions: internal and external corporate characteristics, policy and technology drivers, institutional and market environments, and rating complexity:

"Internal and External Corporate Characteristics": Corporate size, age, debt-to-asset ratio, regional economic development levels, and fiscal expenditure jointly influence ESG performance <sup>[34]</sup>. State-owned enterprises prioritize responsibility due to institutional constraints, while heavily polluting firms face stricter environmental oversight <sup>[11]</sup>.

Policy and Technology Drivers: Air pollution pressures drive green investments <sup>[29]</sup>. Ecological audits enhance ESG practices through information and deterrent effects <sup>[16]</sup>. Digital transformation reduces agency costs and boosts corporate reputation, but its impact varies by ownership and digital maturity<sup>[14,35-36]</sup>.

Institutional and Market Environments: Post-financial crisis demands for social oversight intensified <sup>[15]</sup>. Governments incentivize innovation via tax breaks and green finance<sup>[37-41]</sup>.

Rating and Behavioral Complexity: ESG rating discrepancies stem from divergent standards, scopes, and weights, with environmental dimensions showing the most variance [20]. Digital technologies enable "greenwashing" while empowering stakeholder oversight [42].

### 2.2.2. Research on Real-World Dilemmas in ESG Development

Scholars identify bottlenecks in four areas:

**Insufficient Internal Motivation:** High ESG costs and delayed returns dampen corporate enthusiasm [21]. Heavy polluters face short-term pressures, exacerbating greenwashing [35].

**Institutional and Market Defects:** Lack of disclosure standards undermines voluntary reporting [25]. Rating divergences confuse investors, while ESG faces politicization [41].

**Resource and Technology Constraints:** Firms struggle with funding, talent, and technology gaps. Digital misuse heightens greenwashing risks [42].

**Cognitive and Cultural Conflicts:** Misinterpretations of ESG as "charity", unresolved tensions between traditional ethics and ESG frameworks, and regulatory lags [25] hinder implementation.

### 2.2.3. Research on ESG Development Measurement Methods

Existing measurement systems include mainstream ratings, multidimensional indicators, text analysis, and system models:

**Mainstream Rating Systems:** Hua Zheng ESG Ratings classify firms into nine tiers (C-AAA), widely used to assess ESG performance [21, 4] for their broad coverage and timeliness [27].

**Multidimensional Indicators:** Environmental investments and green mergers (CNRDS data) reflect environmental practices. Financing constraint indices combine financial metrics like accounts receivable turnover.

**Text Analysis and System Models:** ESG news sentiment analysis (Datago database) supplements qualitative evaluation. The E-S-G subsystem coordination model measures ESG quality from a systemic perspective.

**Measurement Controversies and Improvements:** Current methods rely on subjective agency judgments), necessitating localized standards [17] and dynamic adjustments for scientific rigor.

## 2.3. Conclusion

Existing research provides multidimensional insights into ESG theory and practice but lacks in-depth analysis of the baijiu industry's ESG evolution. Measurement methods often rely on generic indicators, neglecting industry-specific factors (e.g., brewing process emissions, water resource management). This study aims to construct a localized ESG evaluation framework tailored to baijiu enterprises, integrating cross-industry experiences to support their green transformation.

## 3. Current Status of ESG Evaluation Indicator Construction

### 3.1. Construction Principles

The establishment of an ESG evaluation indicator system for enterprises must adhere to principles of systematicity, scientific rigor, operational feasibility, and dynamism to comprehensively cover environmental, social, and governance domains while aligning with national strategies such as the "Dual Carbon" goals. Research should holistically integrate external factors (e.g., government policies, industry characteristics), firm-specific characteristics (e.g., ownership structure, size), and executive traits [21], while addressing stakeholder demands to achieve sustainable development through long-term value enhancement [21, 17]. Additionally, attention must be paid to coordinating relationships among ESG subsystems (e.g., balancing environmental and social responsibilities) and avoiding over-reliance on single external ratings.

### 3.2. Construction Methods

Existing studies predominantly employ empirical analysis, selecting A-share listed companies as samples (e.g., data from 2009–2023), excluding ST firms, financial industries, and samples with missing data, followed by winsorization of continuous variables [21]. ESG data primarily originate from Huazheng ESG Ratings (scored on a 9-level scale), supplemented with financial and governance indicators from the CSMAR database [21, 27]. Methodologies include instrumental variable approaches, difference-in-differences (DID) models, and dynamic game theory models [37]. Some studies incorporate text analysis (e.g., keyword extraction from government reports) and artificial intelligence (AI) patent data [4, 37] to enhance multi-dimensionality and dynamism.

### 3.3. Construction Framework

Research commonly begins with driving factors, analyzing mechanisms such as patient capital, government environmental attention, and employee stock ownership plans on corporate ESG performance [21]. For instance, patient capital improves ESG performance by reducing agency costs and financing constraints [21], while government attention enhances corporate behavior via increased environmental investments and executive cognition [4]. Some studies develop integrated models (e.g., ESG coordination and development models) to emphasize subsystem synergies or explore AI's role in promoting ESG investments [37]. Heterogeneity analyses focus on firm types (state-owned vs. non-state-owned), industry attributes (pollution-intensive vs. non-pollution-intensive), and regional disparities [27].

### 3.4. Key Indicators

The environmental dimension (E) includes carbon emissions, energy efficiency, and green investments [21]. The social dimension (S) covers employee satisfaction, community relations, and product quality [17]. The governance dimension (G) emphasizes board structure, transparency, and internal controls. Specific quantitative indicators include Huazheng ESG ratings (Levels 1–9), long-term institutional investor ownership (measuring patient capital) [21], AI patent counts [37], and environmental keyword frequency in government reports [4]. Non-financial indicators, such as media ESG sentiment and supply chain digitalization levels, are also incorporated [17].

### 3.5. Existing Challenges

Current systems face challenges in measuring environmental performance, such as patient capital's insignificant impact on environmental outcomes [21] and corporate "greenwashing" practices [27]. Data limitations include difficulties in quantifying indicators (e.g., social responsibility behaviors), incomplete data access (e.g., supply chain data), and inconsistencies between domestic and international standards [17, 39]. Significant rating divergences exist due to differing scopes, weightings, and standards between domestic and foreign institutions, reducing comparability [39]. Additionally, insufficient endogenous motivation for ESG practices and over-reliance on policy drivers remain critical issues [27].

## 4. ESG Practices and Evaluation Indicator System for Liquor Enterprises

### 4.1. Construction Principles

**Integration of Scientific Rigor and Operational Feasibility:** The indicator system should align with scientific principles and industry-specific characteristics. Indicator selection, screening, and weighting must follow scientific methodologies, supported by reliable data sources and feasible statistical practices to incentivize ESG improvements.

**Balance Between Comprehensiveness and Representativeness:** The system should encompass industry-level ESG frameworks, covering ecological protection, pollution control, resource utilization, climate resilience, product quality, employee rights, and corporate governance.

Unique issues such as resource consumption, product packaging, and grain farmer rights must also be addressed.

Combination of Quantitative and Qualitative Metrics: Quantitative indicators (e.g., carbon intensity, wastewater reuse rates) enable task-oriented ESG goals and cross-comparisons. Qualitative descriptions are necessary for social impacts, governance structures, and other non-quantifiable aspects.

### 4.2. Construction Framework

Guided by the logic of "industry relevance, core issue coverage, dimensional balance, and practice orientation," a systematic framework is developed through hierarchical design and dynamic adaptation. First, focusing on the liquor industry's "high water/energy consumption and emissions," the ESG dimensions are deconstructed:

Environmental (E): Resource efficiency (energy/water consumption per unit of base liquor), pollution control (wastewater/gas compliance rates), and ecological resilience (distillers' grains recycling rates).

Social (S): Product safety, green supply chain management, employee rights, and community engagement.

Governance (G): A three-tier system ("governance structure–risk control–strategic alignment") clarifies roles between Party organizations and boards, while enhancing compliance and disclosure transparency.

Second, industry-specific metrics (e.g., distillery wastewater reuse rates, green packaging adoption) and collaborative requirements (e.g., sustainable training for distributors) are incorporated to ensure relevance and practicality. A "quantitative-dominated, qualitative-supplemented" approach is adopted, with quantitative metrics exceeding 65% (e.g., carbon intensity, charitable contributions). Qualitative metrics (e.g., governance efficacy, cultural integration) are standardized through tiered descriptions to balance objectivity and depth.

Finally, forward-looking indicators (e.g., biodiversity protection measures) and tiered disclosure mechanisms (mandatory for core indicators, voluntary for reference indicators) are established to accommodate policy and technological evolution, offering flexible pathways for firms of varying scales. This "problem-driven, scenario-oriented, iterative" framework systematically addresses ESG risks and opportunities while providing actionable, assessable guidelines for green transformation. See Figure 1 for details.

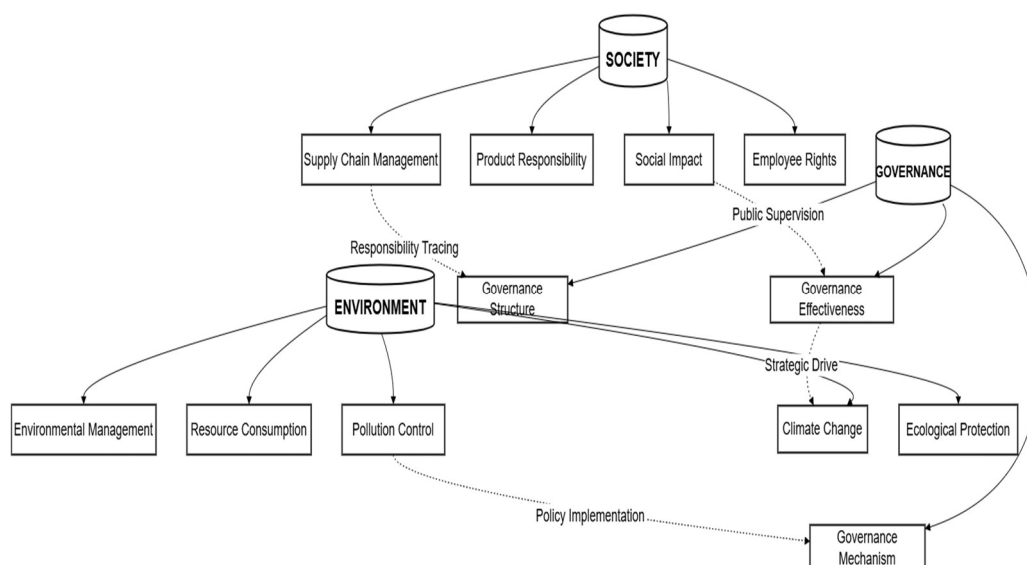


Figure 1. Framework for Indicator Construction

## 5. ESG Evaluation Index System for Liquor Enterprises

### 5.1. Environmental (E) Dimension

The environmental dimension constructs an index system from five aspects: environmental management, resource consumption, pollution prevention, climate change, and ecological protection.

(1) "Environmental Management" focuses on institutional development, with two indicators: "Completeness of Environmental Management Systems and Organizational Structures" and "Preparedness of Emergency Plans for Environmental Incidents." The former evaluates the enterprise's ability to cover the entire process of environmental protection management, while the latter assesses the effectiveness of risk prevention through the frequency of regular drills.

(2) "Resource Consumption" addresses the high energy and water consumption characteristics of the brewing industry. It quantifies "Comprehensive Energy Consumption per Unit of Base Liquor Production" (including total energy such as electricity and steam), "Fresh Water Consumption per Unit of Base Liquor Production," and "Cooling Water Recycling Rate" to promote resource-efficient utilization.

(3) "Pollution Prevention" covers full-chain governance, including "Wastewater Treatment Compliance Rate in Liquor Production," "Resource Utilization Rate of Distillers' Grains," and "Exhaust Gas Emission Compliance Rate." The resource utilization of distillers' grains requires converting waste into valuable products through approaches like feed or fertilizer production.

(4) "Climate Change" includes "Greenhouse Gas Emissions per Unit of Base Liquor Production" and "Adoption Rate of Low-Carbon Technologies," guiding enterprises to optimize their energy structures.

(5) "Ecological Protection" quantifies the preservation of ecological spaces through "Green Coverage Rate of Factory Areas" and "Biodiversity Conservation Measures."

### 5.2. Social (S) Dimension

The social dimension revolves around four areas: product responsibility, supply chain management, employee rights, and social impact.

(1) "Product Responsibility" emphasizes quality safety and environmental attributes, with indicators such as "Detection Rate of Harmful Substances" (e.g., plasticizers, heavy metals) and "Usage Rate of Green Packaging Materials." The latter requires adopting biodegradable or lightweight materials to comply with "plastic restriction" policies.

(2) "Supply Chain Management" fosters industrial chain collaboration through "Proportion of Green-Certified Suppliers" and "Annual Frequency of Green Marketing Training for Distributors" to drive carbon reduction across upstream and downstream activities.

(3) "Employee Rights" address health protection and development needs, quantified by "Coverage Rate of Occupational Health Training" and "Compliance Rate of Employee Welfare Guarantees," fostering a human-centered workplace environment.

(4) "Social Impact" evaluates corporate social responsibility through "Annual Philanthropic Investment as a Percentage of Profits" and "Community Environmental Satisfaction." The former focuses on investments in environmental and educational public projects, while the latter assesses community relationship harmony via third-party surveys.

### 5.3. Governance (G) Dimension

The governance dimension follows a logical framework of "governance structure-governance mechanisms-governance effectiveness."

(1) "Governance Structure" clarifies roles and responsibilities, with indicators such as "Soundness of Collaborative Mechanisms Between the Party Organization and the Board of

Directors" and "Establishment of an ESG Special Committee." The former requires Party organizations to participate in strategic supervision, while the latter ensures ESG goals are implemented through dedicated committees.

(2) "Governance Mechanisms" strengthen institutional safeguards, covering "Completeness of Compliance Management Systems" and "Transparency of ESG Disclosures." The latter adopts GRI standards to hierarchically disclose key data such as carbon emissions and safety incidents.

(3) "Governance Effectiveness" emphasizes sustainable development potential and green technology applications. "Proportion of Green Technology R&D Investment" quantifies long-term corporate commitments to clean production and circular technologies, driving the integration of sustainable development outcomes into business operations.

**Table 1. ESG Indicator System for Liquor Enterprises**

Environmental (E)		Social (S)		Governance (G)	
Environment Management	Environmental Management System and Organizational Structure	Product Responsibility	Production Standards	Governance Structure	Party Organization Governance
	Environmental Risk Prevention & Emergency Response		Product Quality & Safety		Shareholders
Resource Consumption	Comprehensive Energy Consumption per Unit of Base Liquor Production		Responsible Marketing		Board of Directors
	Fresh Water Consumption per Unit of Base Liquor Production		Customer Service & Rights		Supervisory Board
	Raw Material Sourcing		Supplier Management		Senior Management
	Waste Management		Supply Chain Management		Green Logistics Technology Adoption Rate
Packaging Materials	Annual Frequency of Green Marketing Training Activities for Distributors	Risk Management			
Pollution Prevention and Control	Cooling Water Recycling Rate	Employee Rights and Interests	Employee Recruitment & Employment	Compliance Management Mechanism	Supervision & Oversight
	Wastewater Treatment Compliance Rate		Employee Welfare & Protection		Information Disclosure
	Air Pollution Control		Employee Satisfaction with Environmental Quality		Executive Incentives

	Solid Waste Management		Employee Safety & Health		Business Ethics
	Noise Pollution Control		Employee Development	Governance Efficiency	Innovation & Governance Efficiency
	Distillers' Grains Recycling Rate	Social Impact	Annual Philanthropic Investment (% of Profit)		Sustainable Development
Climate Change	Climate Change Risk Management		Community Environmental Satisfaction		Integration of Sustainability into Corporate Culture
	Greenhouse Gas Emissions per Unit of Base Liquor Production	Production Standards	Party Organization Governance		
	Low-Carbon Development	Product Quality & Safety	Shareholders		
Ecological Protection	Land Use & Ecological Protection	Product Responsibility	Responsible Marketing	Governance Structure	Board of Directors
	Biodiversity Conservation		Customer Service & Rights		Supervisory Board
	Proportion of Eco-Labeled Products in Procurement	Supplier Management	Senior Management		
	Centralized Treatment Rate of Production Wastewater & Domestic Sewage	Supply Chain Management	Green Logistics Technology Adoption Rate		Compliance Management
Environment Management	Environmental Management System and Organizational Structure		Annual Frequency of Green Marketing Training Activities for Distributors	Risk Management	
	Environmental Risk Prevention & Emergency Response		Employee Recruitment & Employment	Compliance Management Mechanism	Supervision & Oversight
Resource Consumption	Comprehensive Energy Consumption per Unit of Base Liquor Production	Employee Rights and Interests	Employee Welfare & Protection		Information Disclosure

## 6. Conclusion

This paper systematically examines the uniqueness of ESG practices in the liquor industry under the "Dual Carbon" context, highlighting industry-specific features such as carbon emissions from solid-state fermentation processes and distillers' grain recycling. An ESG

evaluation index system encompassing environmental, social, and governance dimensions is constructed, incorporating distinctive indicators such as "Cooling Water Recycling Rate" and "Distillers' Grain Resource Utilization Rate" into the universal framework. The study identifies gaps in current ESG evaluation systems, particularly in full-lifecycle carbon accounting for liquor production and social responsibility assessments for liquor enterprises. It is recommended that liquor enterprises establish scenario-based ESG data monitoring systems to align with tightening regulatory requirements for ESG disclosures in the industry.

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## References

- [1] Avramov D, Cheng S, Lioui A, et al. Sustainable investing with ESG rating 、 uncertainty[J]. *Journal of Financial Economics*, 2021, 145(2): 642-664.
- [2] Berg F, Koelbel J F, Rigobon R. Aggregate Confusion: The Divergence of ESG Ratings[J]. *Review of Finance*, 2022, 26(6): 1315-1344.
- [3] Chatterji A K, Durand R, Levine D I, et al. Do ratings of firms converge? Implications for managers, investors and strategy researchers[J]. *Strategic Management Journal*, 2016, 37(8): 1597-1614.
- [4] Chen Xiaoshan, Chen Simin. Local Government Environmental Attention and Corporate ESG Performance[J]. *Journal of Guangdong University of Finance and Economics*, 2025, 7(1): 179-183.
- [5] Correia et al. Does ESG performance influence banks' financial performance and risk? Evidence from the COVID-19 pandemic[J]. *International Review of Financial Analysis*, 2024, 93: 102520.
- [6] Cortez M C, Silva F, Areal N. Socially responsible investing in the global market: The performance of US and European funds[J]. *International Journal of Finance & Economics*, 2012, 17(3): 254-271.
- [7] Cui Dengfeng, Bai Ling, Zhang Yuesheng. How Digital Infrastructure Construction Affects Corporate ESG Performance: A Quasi-Natural Experiment Based on the "Broadband China" Pilot Policy[J]. *Management Frontier*, 2025, 38(1): 1-20.
- [8] Dimson E, Marsh P, Staunton M. Divergent ESG ratings[J]. *The Journal of Portfolio Management*, 2020, 47(1): 75-87.
- [9] Drempetic S, Klein C, Zwergel B. The influence of firm size on the ESG score: Corporate sustainability ratings under review[J]. *Journal of Business Ethics*, 2020, 167(2): 333-360.
- [10] Fang M Y, Nie H H, Shen X Y. Can enterprise digitization improve ESG performance?[J]. *Economic Modelling*, 2023, 118: 106101.
- [11] Feng Lingbing. Empirical Test of the Impact of Corporate ESG Performance on Performance Volatility[J]. *Management Decision*, 2025, 7(3): 179-183.
- [12] Garcia-Fuentes et al. Do ESG ratings affect commercial banks' efficiency? International evidence from a meta-analysis[J]. *International Review of Financial Analysis*, 2024, 93: 102536.
- [13] Gibson B R, Krueger P, Schmidt P S. ESG rating disagreement and stock returns[J]. *Financial Analysts Journal*, 2021, 77(4): 104-127.
- [14] Guo J, Bai J. The role of public participation in environmental governance: Empirical Evidence From China[J]. *Sustainability*, 2019, 11(17): 46-96.
- [15] Guo Li. Modernization of Corporate Governance under ESG Trends[J]. *Journal of Peking University (Philosophy and Social Sciences Edition)*, 2023, 60(4): 149-157.
- [16] Guo Mengnan, Tian Yuwei. Research on the Promoting Effect of Ecological and Environmental Audits on ESG Practices[J]. *Audit Research*, 2024, 3: 45-58.
- [17] He Ying, Hao Xiaolu. "Empowerment" or "Burden": Supply Chain Digitalization and Corporate ESG Performance[J]. *Research on Economics and Management*, 2025, 46(2): 96-128.

- [18] Hu Jie, Han Yiming, Zhong Yong. How Corporate Digital Transformation Affects ESG Performance: Evidence from Chinese Listed Companies[J]. *Industrial Economic Review*, 2023(01): 105-123.
- [19] Huang Jun, Wang Yuhe, Han Feifei, Li Yun. ESG Information Disclosure: Connotation Analysis, Evaluation Methods, and Mechanisms[J]. *Foreign Economics and Management*, 2023, 45(6): 3-16.
- [20] Li Huiyun, Liu Qianying, Zheng Hongrui, Zhang Yongji. Are ESG Ratings Homogeneous? A Comparative Study of Achievement-Oriented and Risk-Oriented ESG Ratings[J]. *Management Review*, 2024, 36(2): 45-60.
- [21] Li Sifei, Wen Lei. The Impact of Patient Capital on Corporate ESG Performance[J]. *Management Decision*, 2025, 1: 48-56.
- [22] Li Zhiqing, Fu Chong. *ESG Theory and Practice*[M]. Shanghai: Fudan University Press, 2021.
- [23] Lin et al. Do ESG ratings affect banks' risk-taking? Evidence from China[J]. *International Review of Financial Analysis*, 2024, 93: 102523.
- [24] Lin Hong, Wang Shaowei, Wang Zhixuan. The Impact of Green Local Government Special Bonds on Corporate Environmental, Social, and Governance Performance[J]. *Scientific Decision Making*, 2024, 11(1): 80-95.
- [25] Lou Qiuran. ESG Information Disclosure: Legal Reflection and Institutional Construction[J]. *Securities Market Herald*, 2023, 3(3): 24-34.
- [26] Luzzetti R, Mancini M, Busacca R. ESG and the financial performance of peripheral European banks[J]. *International Review of Financial Analysis*, 2024, 93: 102564.
- [27] Mai Sheng, Wang Zhichao, Wang Zhanjie. The Impact of "Visible Hand" Construction on Corporate ESG Performance under ESG Development Dilemmas[J]. *Management Science*, 2025, 38(1): 1-20.
- [28] Murata R, Hamori S. ESG disclosures and stock price crash risk[J]. *Journal of Risk and Financial Management*, 2021, 14(2): 70-71.
- [29] Pan Yukun, Guo Mengmeng. Corporate ESG Performance under Air Pollution Pressure[J]. *Journal of Quantitative & Technological Economics*, 2023, 40(7): 112-132.
- [30] Pedersen L H, Fitzgibbons S, Pomorski L. Responsible investing: The ESG-efficient frontier[J]. *Journal of Financial Economics*, 2021, 142(2): 572-597.
- [31] Peng Yuchen. Legal Justification and Rule Construction of Mandatory ESG Information Disclosure[J]. *Oriental Law*, 2023, 18(4): 152-164.
- [32] Qian S, Yu W. Green finance and environmental, social, and governance performance[J]. *International Review of Economics & Finance*, 2024, 89: 1185-1202.
- [33] Shao Jianbing. Mixed-Ownership Reform and High-Quality Development of the Private Economy: A Study Based on Corporate ESG Performance[J]. *Economic Issues*, 2024(3): 16-22.
- [34] Shen Kunrong, Zhang Cheng. Analysis of the Impact of Internal and External Corporate Characteristics on ESG Performance[J]. *China Industrial Economics*, 2021, 5: 89-104.
- [35] Shi Yutang, Wang Xiaodan, Guo Yue, Zhou Shitong. How ESG Ratings Achieve "Quality and Quantity Improvement" in Corporate Green Innovation[J]. *Science of Science and Management of S&T*, 2024, 45(11): 162-179.
- [36] Sun Na, Qu Weihua. ESG Performance Empowers New Quality Productivity under the "Dual Carbon" Goals[J]. *Statistics & Information Forum*, 2024, 39(10): 24-41.
- [37] Tang Qiuyu, Tan Weijie, Shen Minghao, Xu Lei. Can Artificial Intelligence Improve Corporate ESG Performance? A Cost-Income Analysis Based on Dynamic Game Theory[J]. *Journal of Financial Research*, 2025, 51(2): 94-108.
- [38] Vinuesa R, Azizpour H, Leite I, et al. The role of artificial intelligence in achieving the Sustainable Development Goals[J]. *Nature Communications*, 2020, 11(1): 233.
- [39] Wang Ren, Wang Weihai, Song Shuangshuang. ESG Rating Disagreements and Corporate Financing Constraints: Effects, Channels, and Heterogeneity[J/OL]. *Collected Essays on Finance and Economics*, 2025. <https://doi.org/10.13762/j.cnki.cjlc.20250303.001>
- [40] Wei Ping, Liu Hongman, Xu Chaokai. ESG and Export Product Structure Upgrading: Perspectives from Environmental and Economic Sustainability[J]. *World Economy Studies*, 2025, 4(2): 40-57.

- [41] Xiao Hongjun. Deconstruction and Reconstruction: Reunderstanding ESG[J]. Journal of Jinan University (Philosophy and Social Sciences Edition), 2024, 5(5): 84-107.
- [42] Yin Juelin, Zhao Jiabin, Hua Xinyi, Sun Xiao. High-Quality ESG Information Disclosure: Decision-Making and Governance of Corporate ESG Greenwashing in the Era of Digital Intelligence[J]. Journal of Xi'an Jiaotong University (Social Sciences Edition), 2025, 45(1): 27-39.