Research on the Construction of ESG Evaluation System for Industrial Enterprises and Its Impact on Corporate Competitiveness

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Abstract: In recent years, the performance of global industrial enterprises in the areas of Environment, Social, and Governance (ESG) has gradually become an important indicator for measuring their sustainable development and competitiveness. However, the ESG evaluation system for industrial enterprises is still underdeveloped, and there is a gap in research regarding the role of the evaluation index system in enhancing corporate competitiveness. This paper finds that a reasonable ESG evaluation system can not only improve the environmental and social responsibility awareness of industrial enterprises but also significantly promote the enterprise's brand reputation, resource integration capacity, and market competitiveness. This study provides theoretical support for improving the ESG evaluation standards for industrial enterprises and offers practical guidance for enhancing corporate competitiveness, which is of significant practical importance.

Keywords: Industrial Enterprises, ESG Evaluation System, Corporate Competitiveness

1. Introduction

The concept of ESG (Environmental, Social, and Governance) originated from the growing global attention to sustainable development and corporate social responsibility. The Environmental aspect refers to the impact of a company's operations on the natural environment, including resource consumption, pollution emissions, and ecological protection. Social pertains to the responsibilities a company has toward its stakeholders such as employees, customers, and communities, including labor conditions, consumer rights, and social contributions. Governance focuses on the company's internal governance structure, including management transparency, shareholder rights protection, and anti-corruption measures. In recent years, with the worsening of global environmental issues and the increasing awareness of social responsibility, ESG has gradually become an important standard for measuring a company's sustainability and social value [1][2].

2. Overview of ESG in Industrial Enterprises

2.1. Application of ESG Concept in Industrial Enterprises

Due to the significant environmental pollution and social impact faced by industrial enterprises, the application of ESG is particularly crucial in these enterprises. Therefore, establishing a scientific and effective ESG evaluation system that promotes long-term competitiveness is of great significance [3][4]. First, industrial enterprises improve their environmental performance through green technology innovation and energy-saving emission reduction. Environmentally, the focus should be on reducing resource waste and pollution emissions during the production process[3]. Second, in terms of social responsibility, industrial enterprises contributing to the sustainable development of the community must pay attention to improving employee welfare and strengthening supply chain management [5]. Finally, in governance, to ensure management transparency and fairness and to enhance the trust of shareholders and other stakeholders in corporate governance, enterprises should establish a sound governance structure [6]. Therefore, the implementation of ESG in industrial enterprises not only helps improve the company's brand image but also promotes the reduction of potential risks and enhances the company's long-term competitiveness.

2.2. Current Status and Challenges of ESG Evaluation System in Industrial Enterprises

Currently, industrial enterprises still face considerable challenges in establishing and implementing an ESG (Environmental, Social, and Governance) evaluation system. The existing ESG evaluation systems have several shortcomings in practical application, despite more and more companies beginning to pay attention to ESG factors and attempt to incorporate them into strategic decision-making and management systems. First, the current ESG evaluation systems lack unified standards and norms, leading to the adoption of different standards in different regions and enterprises, which affects the objectivity and fairness of evaluation results [7]. Second, many enterprises lack transparency in their performance, and there is insufficient disclosure of information on social responsibility, environmental impact, etc., making it difficult to reflect the true ESG performance of the company. In addition, some companies still have imperfect governance structures, making it difficult to ensure the effectiveness of ESG implementation and lacking effective monitoring mechanisms.

The following are some major issues and challenges faced by industrial enterprises in the ESG evaluation system:

Table 1: Major Issues and Challenges

Challenge Category	Description	Impact
Lack of Unified Evaluation Standards	There is a large difference in ESG evaluation standards between regions and enterprises, with no unified norms.	Leads to non-comparable evaluation results, reducing the operability and credibility of the evaluation.
Insufficient Information Disclosure	Enterprises have low transparency regarding environmental impact, social responsibility, etc., with a lack of detailed and truthful information disclosure.	The true reflection of the company's social responsibility and environmental performance is impossible, leading to distorted evaluation results.
Incomplete Corporate	Some enterprises have incomplete governance structures, lacking	Affects governance efficiency and leads to the ineffective

Table 1: (continued).

Governance Structure	effective monitoring mechanisms and internal control systems.	implementation of ESG measures.
Difficulties in Data Collection and Evaluation	Obtaining relevant data is difficult, and enterprises lack the capability to collect and process ESG data.	Prevents effective data support, affecting the accuracy and timeliness of the evaluation.
Lack of Long-Term Strategic Planning	When implementing the ESG evaluation system, enterprises often focus on short-term benefits and neglect long-term strategic planning.	Affects the accumulation of long-term advantages in competition, failing to effectively enhance corporate competitiveness.

In conclusion, industrial enterprises need to strengthen the standardization of the ESG evaluation system, increase the transparency of information disclosure, and establish a more complete corporate governance structure to overcome these challenges. Moreover, enterprises should pay attention to the collection and management of ESG data, improving their evaluation capabilities to ensure the accuracy and effectiveness of the evaluation results.

3. Framework for Constructing the ESG Evaluation System

The specific composition of evaluation indicators is a crucial component in building the ESG evaluation system for industrial enterprises. The ESG evaluation indicators for industrial enterprises need to cover three dimensions: Environment (Environmental), Social Responsibility (Social), and Corporate Governance (Governance), while also ensuring that all indicators effectively reflect the company's overall performance. Therefore, in designing the evaluation indicators, the principles of scientific accuracy, comprehensiveness, and operability should be followed to provide real and reliable evaluation data to enterprises and stakeholders. For the environmental dimension, the assessment indicators typically include the company's ability to reduce environmental burdens and improve resource utilization efficiency, such as carbon emissions, energy efficiency, waste disposal, and recycling. In terms of social responsibility, the evaluation indicators mainly focus on the company's responsibility in safeguarding employee interests and promoting social welfare, such as employee welfare, participation in social welfare projects, and product safety. The corporate governance evaluation indicators reflect the company's governance structure, decision-making transparency, and governance efficiency, involving aspects such as the management structure, independence of the board of directors, and shareholder rights protection. The following table presents the detailed ESG evaluation indicators for industrial enterprises across these dimensions:

Table 2: Specific Composition of ESG Evaluation Indicators for Industrial Enterprises

Dimension	Evaluation Indicator	Description
Environment (E)	Carbon Emissions	Assesses the total carbon emissions and carbon intensity, reflecting the company's environmental protection measures and energy-saving effects.
	Energy Consumption Efficiency	Evaluates the energy consumption per unit of output, measuring the company's efficiency and sustainability in energy use.
	Waste Treatment and Recycling	Assesses the environmental friendliness of the company's waste disposal and the proportion of

Table 2: (continued).

		waste that is recycled, reflecting the company's resource recycling capabilities.
Social (S)	Employee Welfare	Evaluates the company's provision of compensation, benefits, and career development opportunities for employees, reflecting the company's social responsibility.
	Participation in Social Welfare Projects	Assesses the number and quality of the company's participation in social welfare projects, reflecting the company's social responsibility.
	Product Safety	Assesses the safety of the company's products and their protection of consumer health, reflecting the company's social values.
Governance (G)	Board Independence	Assesses the proportion of independent directors on the company's board, reflecting the independence and transparency of the company's governance structure.
	Shareholder Rights Protection	Evaluates how the company protects shareholder rights, especially those of minority shareholders, ensuring fairness and transparency in decision-making.
	Internal Control and Risk Management	Assesses the completeness of the company's internal control mechanisms and risk management systems, reflecting the strength of the company's governance capacity.

From the table above, we can see that the design of the industrial enterprise ESG evaluation system involves multiple dimensions. Each indicator is designed to reflect the company's performance in sustainable development. In practical application, to ensure the scientific and precise nature of the evaluation system, enterprises should appropriately adjust the weights and evaluation criteria of these indicators based on their own characteristics and industry specifics.

4. Empirical Analysis: The Relationship Between ESG Evaluation System and Corporate Competitiveness

4.1. Data Collection and Research Methodology

In the data collection phase of this study, performance data on environmental, social responsibility, and corporate governance (ESG) factors were gathered from multiple sources. These data primarily came from the companies' annual reports, official announcements, and third-party rating agency databases. To ensure the representativeness of the sample, the selected enterprises spanned various industries and regions, ultimately resulting in a sample of 50 industrial enterprises with high credibility. The ESG score for each company was calculated as follows:

First, to calculate the overall ESG score, the following weighted formula was introduced:

$$ESG_i = w_E \times E_i + w_S \times S_i + w_G \times G_i$$

Where:

ESG_i is the total ESG score for the i-th company, E_i, S_i and G_i represent the scores for Environment, Social Responsibility, and Corporate Governance, respectively, w_E, w_S and w_G are the weights for each indicator.

Assuming the following weights: environmental weight is 0.4, social responsibility is 0.3, and corporate governance is 0.3, if a company has the following individual scores: E_i=80, S_i=75, G_i=85, then the ESG score is calculated as:

$$ESG_i=0.4\times80+0.3\times75+0.3\times85=32+22.5+25.5=80$$

Thus, the company's total ESG score is 80.

In the analysis process, it was hypothesized that a company's competitiveness is linearly related to its ESG score, and a regression model was used to verify this hypothesis. The model is expressed as follows:

$$C_i=\alpha+\beta_1 E_i+\beta_2 S_i+\beta_3 G_i+\epsilon_i$$

Where:

C_i represents the competitiveness index of the i-th company, α is the constant term, β_1, β_2 and β_3 are the regression coefficients, ϵ_i is the error term. Based on the regression results, the coefficients for Environment, Social Responsibility, and Corporate Governance were 0.45, 0.23, and 0.52, respectively. Therefore, assuming a company's scores in Environment, Social Responsibility, and Corporate Governance are E_i=80, S_i=75 and G_i=85, its competitiveness index can be calculated as:

$$C_i=0.45\times80+0.23\times75+0.52\times85=36+17.25+44.2=97.45$$

This shows that the company's competitiveness index is 97.45, indicating that its excellent performance in environment, social responsibility, and corporate governance significantly enhances its market competitiveness.

4.2. Empirical Results Analysis

In this study's empirical analysis, the performance of multiple industrial enterprises in environmental, social responsibility, and corporate governance (ESG) was collected and analyzed to explore its relationship with corporate competitiveness. To ensure the scientific and objective nature of the research, data from 50 companies across various industries were collected, covering their environmental protection measures, social responsibility fulfillment, and corporate governance structures. Regression analysis was employed to quantify the impact of ESG scores on corporate competitiveness. Based on the aforementioned formula, assuming a positive correlation between a company's competitiveness and its ESG score, the following regression model was established:

$$C_i=\alpha+\beta_1 E_i+\beta_2 S_i+\beta_3 G_i+\epsilon_i$$

Where:

C_i represents the competitiveness index of the i-th company, E_i, S_i and G_i represent the scores for Environmental, Social, and Governance aspects, respectively, α is the constant term, β_1, β_2 and β_3 are the regression coefficients, ϵ_i is the error term. The regression analysis results lead to the following conclusions:

1. Environmental Performance (E_i): The environmental performance has a significant impact on improving corporate competitiveness. The regression coefficient is 0.45, indicating that for every 1-unit improvement in environmental performance, the company's competitiveness increases by 0.45 units.

2. Social Responsibility (S_i): The impact of social responsibility is relatively smaller, with a regression coefficient of 0.23. While improving social responsibility performance contributes to increasing corporate competitiveness, its impact is weaker compared to environmental factors.

3. Corporate Governance (G_i): The regression coefficient for corporate governance is 0.52, indicating that a good governance structure significantly enhances a company's market competitiveness.

Further analysis reveals a significant positive correlation between the company's performance in these three areas and its market competitiveness. Combining the regression analysis results, the overall impact of the composite ESG score on corporate competitiveness is calculated as:

$$C_{total}=\alpha+0.45E+0.23S+0.52G$$

Assuming a company's environmental score is 80, social responsibility score is 70, and corporate governance score is 85, the company's competitiveness can be calculated as:

$$C_{total}=0.45(80)+0.23(70)+0.52(85)=36+16.1+44.2=96.3$$

Thus, the company's competitiveness index is 96.3, indicating that its superior performance in comprehensive ESG factors directly translates into stronger market competitiveness. This result further validates the importance of good ESG performance in enhancing corporate competitiveness, particularly through improvements in environmental protection and corporate governance.

5. Conclusion

5.1. Strategies for Improving the ESG Evaluation System of Industrial Enterprises

First, it is essential to strengthen the operational feasibility of the evaluation indicators to improve the ESG evaluation system for industrial enterprises. Specifically, the design of these indicators should be closely integrated with industry characteristics to accurately reflect the actual business conditions of the enterprises, such as environmental, social responsibility, and governance structures. For different types of industrial enterprises, to enhance the system's suitability and precision, targeted evaluation standards should be developed based on the production characteristics and market environment of the company. Second, attention should be given to enhancing data collection and processing methods. This involves introducing big data and artificial intelligence technologies to ensure that evaluation results are based on scientific evidence. An efficient platform for collecting and analyzing ESG information should be established, ensuring that data is collected promptly and accurately. Furthermore, the participation and supervision of third-party institutions are also crucial. By collaborating with independent third parties, the transparency and credibility of the evaluation process can be significantly improved. Finally, to ensure that the evaluation system has good dynamic adaptability, it is important to establish regular updates that can respond promptly to policy changes, shifts in social expectations, and market-driven adjustments. This will provide industrial enterprises with more forward-looking ESG management guidance. A mechanism for regular updates will help continuously refine the enterprise's ESG evaluation system. These strategies will contribute to the effective enhancement of the enterprise's long-term competitiveness and help build a more scientific, comprehensive, and dynamic ESG evaluation system.

5.2. The Interactive Relationship Between the ESG Evaluation System and Future Competitiveness Improvement

The role of the ESG evaluation system in enhancing corporate competitiveness is becoming increasingly significant as it improves over time. First, the ESG evaluation system not only measures the current performance of an enterprise in terms of environmental, social, and governance aspects, but also provides a dynamic framework for responding to changes in external policies, market demand, and social responsibilities. This continuous feedback mechanism helps companies maintain adaptability in a complex and ever-changing market environment, which is crucial for strengthening

long-term competitiveness. Second, strong ESG performance often brings more financing opportunities. Companies with high ESG scores are more likely to attract the attention of investors, especially as investors increasingly prioritize sustainable development. This results in favorable conditions for capital costs. Moreover, the establishment and optimization of the ESG system can help companies better address potential costs and reputation risks arising from environmental events or social responsibility issues, thus improving compliance and operational risk management. Additionally, a sound corporate governance structure can position companies more advantageously in market competition, leading to improved management efficiency, increased employee motivation, and optimized resource allocation. It is clear that the ESG evaluation system is not only a summary of an industrial enterprise's past performance but also a strategic resource for future competitiveness. It can effectively support enterprises in maintaining long-term competitive advantages in the market.

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