

Article

When Green Speaks: Corporate Biodiversity Attention and Sustainable Development Performance

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Abstract

As a core support for ecosystem service functions, biodiversity profoundly affects corporate resource acquisition and long-term value creation. Based on data from Chinese A-share listed companies from 2010 to 2023, this paper constructs a biodiversity attention dictionary using textual analysis and measures corporate biodiversity attention by the number of sentences containing biodiversity-related terms in annual reports. It empirically examines the impact of corporate biodiversity attention on sustainable development performance and its underlying mechanisms. This study demonstrates that corporate biodiversity attention significantly enhances sustainable development performance. Mechanism analysis reveals that corporate biodiversity attention primarily promotes sustainable development performance through three pathways: alleviating financing constraints, fostering green technology innovation, and accelerating digital transformation. Heterogeneity analysis further indicates that this positive effect is more pronounced in heavily polluting industries, non-high-tech enterprises, regulated industries, and firms with a high market share. Economic consequence analysis shows that improvements in corporate sustainable development performance significantly enhance corporate resilience, enabling stable operations and rapid recovery under external shocks. Therefore, firms should strengthen biodiversity disclosure, integrate biodiversity into strategic decision-making frameworks, and promote the coordinated advancement of green technology innovation and digital transformation. Regulatory authorities should accelerate the development of unified disclosure standards and implement differentiated policy guidance to facilitate the high-quality development of enterprises in the process of green transition.

Keywords: biodiversity attention; sustainable development performance; technological innovation



Academic Editor: Junggho Baek

Received: 8 June 2026

Revised: 29 June 2026

Accepted: 1 July 2026

Published: 8 July 2026

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1. Introduction

Biodiversity is a core support for ecosystem service functions, and its continuous loss is profoundly affecting enterprises' resource acquisition, supply chain stability, and long-term value-creation capabilities. In December 2022, the adoption of the “Kunming-Montreal Global Biodiversity Framework” clearly stipulated for the first time that enterprises should monitor and disclose their impact on biodiversity. This marked the official inclusion of biodiversity responsibility in the global policy agenda. The updated data of the Red List of Threatened Species released by the World Conservation Union in 2025 shows that approximately 28% of the 172,620 species assessed are at risk of extinction. Meanwhile, the Global

Risks Report released by the World Economic Forum in 2025 ranked biodiversity loss and ecosystem collapse as the second-largest long-term risk, only after extreme weather events. The Inter-Governmental Science-Policy Platform on Biodiversity and Ecosystem Services released the Methodological Assessment Report on Enterprises and Biodiversity in 2026. This report provides a systematic framework at the methodological level for enterprises to quantify their impacts and dependencies on biodiversity. In this context, corporate biodiversity attention has risen from the level of social responsibility to become a key variable that influences their strategic decisions and sustainable development performance.

How exactly does corporate biodiversity attention affect sustainable development performance? In recent years, the academic community has carried out initial explorations around this issue. He et al. (2024) [1] constructed an indicator for the biodiversity risk exposure of Chinese enterprises based on text analysis methods and found that the risk exposure of Chinese enterprises in this dimension was significantly higher than that of American enterprises. Sun et al.'s (2025) research indicates that proactive biodiversity risk management can significantly enhance enterprise value, and green innovation is the key transmission mechanism within this process [2]. Li et al. (2025) [3] found that biodiversity concerns enhance the ESG performance of enterprises through two channels: promoting green innovation and external regulation. At the supply chain level, Jin (2025) [4] pointed out that biodiversity risks have a significant negative impact on the resilience of enterprise supply chains by exacerbating the mismatch of investment and financing terms and increasing agency costs. Deng et al. (2025) [5] found that enterprises facing higher biodiversity risks tend to increase rather than decrease their investments. This effect is particularly pronounced in highly competitive industries. Overall, the existing literature mostly focuses on the economic consequences of biodiversity risks or a single management strategy. There is a lack of systematic empirical testing on the core issue of how enterprises' attention to biodiversity can jointly influence sustainable development performance through multiple mechanisms.

This paper takes Chinese A-share listed companies from 2010 to 2023 as the sample to systematically investigate the impact of enterprises' attention to biodiversity on their sustainable development performance and the transmission mechanism. Compared to the existing literature, the marginal contributions of this paper mainly lie in the following three aspects: First, a set of enterprise biodiversity attention definitions applicable to the Chinese context has been constructed. The text analysis method is adopted, using the number of complete sentences of relevant words in the annual reports as the measurement unit. Compared to the traditional keyword frequency statistics method, it can more effectively capture the real depth of enterprises' strategic attention to biodiversity issues. Second, financing constraints, green technological innovation and digital transformation are included in the unified analysis framework, which reveals three parallel and mutually coordinated transmission paths, deepening the understanding of the mechanism of how the attention of enterprises to biodiversity issues is transformed into the improvement of sustainable development performance. Third, heterogeneity analysis is conducted with respect to four dimensions: industry pollution degree, enterprise technical attributes, industry regulatory degree and market share. The economic consequences of sustainable development performance on enterprise resilience are tested in order to provide empirical evidence for differentiated policy design and strategic choices.

2. Literature Review, Theoretical Analysis and Research Hypotheses

2.1. Corporate Biodiversity Attention and Sustainable Development Performance

Performance in enterprise sustainable development, as an important indicator for measuring the coordinated development of economic, environmental and social bene-

fits, has become a focus of attention for both the academic community and the practical sector [6]. Biodiversity, as the core support for ecosystem service functions, undergoes changes that profoundly affect an enterprise's resource acquisition, production operations, and long-term value-creation capabilities [1,7]. In this context, enterprises' concern for biodiversity has evolved from a simple act of fulfilling social responsibilities to become a key strategic variable and internal driving factor that impacts their sustainable development performance.

Current research has revealed a positive correlation between enterprises' attention to biodiversity and their sustainable development performance from multiple perspectives. At the levels of reputation and risk management, when enterprises actively pay attention to and participate in biodiversity conservation, they can convey positive environmental responsibility signals to the market. This not only significantly enhances social reputation [8] and improves financial performance [9] but also effectively reduces the risk of stock market crashes [10] and operational uncertainties [11] caused by exposure to biodiversity risks. At the levels of financing and resource acquisition, the full disclosure of biodiversity-related information can alleviate the information asymmetry between enterprises, investors, and financial institutions, thereby significantly reducing financing constraints and the cost of debt financing [12]. Enterprises that pay attention to biodiversity are more likely to obtain green credit support from banks, and the proportion of long-term loans significantly increases [13], providing a stable financial guarantee for sustainable development. At the innovation-driven level, enterprises' attention to biodiversity exposure can enhance the green perception and environmental governance awareness of their executives [14], thereby promoting green technological innovation investment and transformation [15]. Moreover, green technological innovation, as the core link connecting environmental responsibility and performance improvement, has been proven to have a significant positive impact on the collaborative growth of enterprises' economic performance and environmental performance [16,17]. Furthermore, under the dual drive of policy regulations and market competition, enterprises with a high focus on biodiversity are more likely to align with a green development policy orientation [18], obtaining policy support such as tax incentives and financial subsidies. At the same time, they can gain a differentiated competitive advantage in environmentally sensitive markets [19], which further enhances the effect of improving sustainable development performance. Based on this, this paper puts forward the following hypothesis:

H1. *The higher an enterprise's corporate biodiversity attention, the better its sustainable development performance will be.*

2.2. Conduction Path Analysis

Financing constraints are a major bottleneck restricting the sustainable development of enterprises. Their alleviation can provide crucial financial support for green transformation and long-term value creation. On the one hand, when enterprises proactively pay attention to and disclose biodiversity information, this can convey a positive environmental responsibility signal to the capital market and effectively alleviate information asymmetry, thereby reducing financing constraints and the cost of debt financing and making it easier to obtain bank loan support [12,13]. The development of green finance has also provided significant support for biodiversity conservation [18]. On the other hand, the alleviation of financing constraints can provide financial support for enterprises' long-term investments, such as green research and development and environmental governance, thereby promoting the improvement of sustainable development performance [20]. Factors such as digital finance [21], financial flexibility [22], and supply chain digitization [23] also have a positive impact on enterprises' sustainable development performance by al-

leviating financing constraints. This indicates that enterprises' attention to biodiversity provides stable financial support for the improvement of sustainable development performance by alleviating financing constraints. Based on this, this article puts forward the following hypothesis:

H2a. *Corporate biodiversity attention improves sustainable development performance by alleviating financing constraints.*

Green technological innovation serves as the key link that connects corporate biodiversity attention and sustainable development performance. Its enabling effect has been widely confirmed by the academic community. From the perspective of resource-based theory, corporate attention to biodiversity can stimulate executives' green awareness, prompting firms to transform ecological conservation needs into drivers of technological innovation. By increasing investment in green R&D and optimizing production processes, companies can build differentiated competitive advantages [14,24]. Furthermore, whether it is digital transformation [16,25], green and low-carbon transition [19], or the development of new, quality productive forces [26], their positive impacts on sustainable development performance are significantly mediated by green technological innovation. Biodiversity concern, by strengthening corporate environmental responsibility and guiding resources toward green initiatives, provides clear directional guidance and solid resource support for green technological innovation [13,27]. Du et al. (2022) [28] found, against the backdrop of the low-carbon city policy, that green technological innovation serves as a crucial pathway to improving ecological efficiency. Using panel data from the Middle East, North Africa and the South Caucasus, Kilinc-Ata and Proskuryakova (2026) [29] empirically evaluated the impacts of innovation and digitalization on carbon footprints. The product differentiation and cost advantages brought by green technological innovation can not only help firms align with policy objectives to obtain subsidies and credit support but also enhance market recognition to expand market share, ultimately driving continuous improvement in sustainable development performance. Based on this, the paper proposes the following hypothesis:

H2b. *Corporate biodiversity attention enhances sustainable development performance by boosting green technological innovation.*

Digital transformation, as the core engine for corporate biodiversity attention in the digital economy era, has a synergistic effect with enterprises' attention to biodiversity, which has become an important path for performance improvement. From the perspective of dynamic capability theory, corporate biodiversity attention is essentially a strategic response to the dynamic changes in the ecological environment. This response will compel enterprises to accelerate the process of digital transformation by integrating digital technologies with ecological management needs and building core capabilities that are both environmentally adaptable and operationally efficient [30,31]. Specifically, the increased attention to biodiversity has prompted enterprises to increase their investment in digital technologies such as the Internet of Things and big data, which are applied in scenarios such as ecological data monitoring and green supply chain management. Digital transformation can achieve a win-win situation in terms of financial performance and environmental performance by optimizing production processes [32] and improving resource allocation efficiency [16]. The improvement of external digital environments, such as digital infrastructure construction [33] and supply chain digitization [23], further provides support for enterprises with high biodiversity attention levels to transform, strengthening the enabling effect of digital transformation on sustainable development performance. Based on this,

the improvement in information transparency brought about by digital transformation [34] and the optimization of management efficiency [35] can help enterprises better align with the requirements of biodiversity protection policies and obtain policy benefits and market recognition. The cross-country study conducted by Kilinc-Ata and Proskuryakova (2026) [29] reveals that the synergistic effect of digitalization and innovation can significantly reduce carbon footprints across diverse regional contexts, providing cross-country comparative evidence for the environmentally sustainable effects of digital transformation. Therefore, this paper proposes the following hypothesis:

H2c. *Corporate biodiversity attention improves sustainable development performance by accelerating digital transformation.*

3. Data, Variables and Methods

3.1. Data Source and Sample Selection

The paper selected all A-share listed companies from 2010 to 2023 as the sample and screened the sample according to certain conditions: (1) exclude financial insurance companies and real estate companies; and (2) exclude companies with missing data. The relevant financial data all come from the Guotai An database. Based on the original data, this paper reduces the influence of extreme values and outliers by truncating the financial data variables by 1% at both ends.

3.2. Variable Declaration

3.2.1. Dependent Variable

The dependent variable in this article is sustainable development performance (*SusDev1*). Drawing on the approach of Wang Bo et al. (2023) [6], this article measures enterprise sustainable development performance from two dimensions: financial performance and environmental performance. Among them, financial performance is measured by the return on assets (*ROA*), and environmental performance is measured by the environmental score (*esrp*) in the Bloomberg ESG scoring system. For Bloomberg environmental disclosure scores, missing values are imputed using the industry-year median. To eliminate dimensional differences, *ROA* and corresponding variables are first standardized via the Min–Max method to map their values into the range of [0, 1]. On this basis, a comprehensive indicator of corporate sustainable development performance is constructed using the coupling coordination degree model:

$$SusDev1 = (1 - |ROA - esrp|) \times \sqrt{ROA \times esrp}$$

3.2.2. Explanatory Variable

The explanatory variable of this article is corporate biodiversity attention (*Bio*). To measure the degree of an enterprise's concern for biodiversity, this article first constructed a set of biodiversity vocabulary definitions applicable to the Chinese context. Considering the diversity characteristics of biological species and ecosystems, as well as the complexity of Chinese vocabulary, this article retrieved literature with the theme of "biodiversity" from China National Knowledge Infrastructure (CNKI), used text mining methods to extract the keywords therein, and, after manual screening and verification, finally determined 446 core keywords to form a biodiversity dictionary. On this basis, following the approach of Giglio et al. (2023) [7], attention to biodiversity is defined as the number of sentences in the enterprise's annual report that mention biodiversity-related words. Specifically, a period is used as the delimiter, and the annual reports of listed companies are split into independent sentences. Then, the total number of sentences containing one or more biodiversity words in each company's annual text is counted. The higher this value is,

the higher the degree of the enterprise's concern for biodiversity. This study adopts the sentence-counting method rather than word frequency statistics or TF-IDF weighting for two main reasons. On the one hand, sentence counting can reflect the coverage breadth of discussions on biodiversity-related topics instead of merely capturing the frequency intensity of repeated keywords under a single theme. On the other hand, compared to raw word frequency statistics, sentence counting effectively avoids data bias caused by deliberate keyword stuffing, thus delivering more robust and reliable results.

3.2.3. Control Variables

This article draws on the research of Zhou et al. (2025) [36] and selects control variables from aspects such as company financial characteristics and corporate governance factors (Table 1), including firm age (*Firmage*), proportion of institutional investor holdings (*Inst*), return on equity (*Roe*), growth potential (*Growth*), accounts receivable ratio (*Rec*), quick ratio (*Quick*), dual positions (*Dual*), proportion of independent directors (*Indep*), board size (*Board*), and proportion of management shareholding (*Mshare*). In addition, this article also controls for year (*Year*) and industry (*Industry*) dummy variables.

Table 1. Variable Definitions.

Variable Type	Variable Name	Variable Symbol	Variable Definition
Dependent variable	Sustainable development performance	<i>SusDev1</i>	After standardization, the calculation of financial performance and environmental performance yields
Explanatory variable	Corporate biodiversity attention	<i>Bio</i>	The number of sentences related to biodiversity terms in the annual report
Control Variables	Firm age	<i>Firmage</i>	Take the difference between the current year and the year of establishment of the enterprise, add 1, and then take the logarithm
	The shareholding ratio of institutional investors	<i>Inst</i>	The ratio of the number of shares held by institutional investors to the total number of shares in the company's capital stock
	Profit rate of asset	<i>Roe</i>	Net profit/Shareholders' equity
	Growth	<i>Growth</i>	The ratio of the increase in operating income to the operating income of the previous period
	Percentage of accounts receivable	<i>Rec</i>	The ratio of net accounts receivable to total assets
	Quick ratio	<i>Quick</i>	The ratio of current assets excluding inventory to current liabilities
	Duality	<i>Dual</i>	The chairman and the general manager are the same person if it is 1, otherwise it is 0
	The proportion of independent directors	<i>Indep</i>	The ratio of the number of independent directors to the total number of board members
	Directorate size	<i>Board</i>	The number of board members is calculated using the natural logarithm
	Level of managerial share ownership	<i>Mshare</i>	The ratio of the number of shares held by the directors, supervisors and senior management to the total number of shares in the company
	Year	<i>Year</i>	Year dummy variables
	Industry	<i>Industry</i>	Industry dummy variables (classified according to the CSRC industry classification standard)

3.3. Research Design

To investigate whether enterprises' concern for biodiversity will affect their sustainable development performance, this article constructs the following baseline regression model:

$$SusDev1_{i,t} = \beta_0 + \beta_1 Bio_{i,t} + \beta_k Controls_{i,t} + \mu_t + \gamma_i + \varepsilon_{i,t} \quad (1)$$

where $SusDev1_{i,t}$ represents the sustainable development performance of enterprise i in the t -th year, $Bio_{i,t}$ represents the degree of attention to biodiversity of enterprise i in the t -th year, and $Controls_{i,t}$ represents a series of control variables; the model incorporates industry fixed effects (γ_i) to absorb time-invariant systematic differences at the industry level and year fixed effects (μ_t) to capture common temporal trends. $\varepsilon_{i,t}$ represents the random disturbance term. Additionally, the standard errors of all regression coefficients are clustered at the enterprise level.

4. Empirical Results and Analysis

4.1. Descriptive Statistics

Table 2 presents the descriptive statistics of the main variables. As can be seen from the table, the minimum value of the enterprises' biodiversity attention level (Bio) is 0.0000, the maximum value is 63.0000, the average value is 6.9142, and the standard deviation is 10.1130. This indicates that there is a significant difference in the biodiversity attention levels among the sample enterprises. The minimum value of the enterprises' sustainable development performance ($SusDev1$) is 0.0031, the maximum value is 0.7402, the mean value is 0.3879, and the standard deviation is 0.1722. This suggests that the current level of enterprise sustainable development performance is generally low.

Table 2. Descriptive Statistics of the Main Variables.

Variables	N	Mean	SD	Min	M	Max
<i>Bio</i>	40,825.0000	6.9142	10.1130	0.0000	4.0000	63.0000
<i>SusDev1</i>	40,825.0000	0.3879	0.1722	0.0031	0.3884	0.7402
<i>FirmAge</i>	40,825.0000	2.9370	0.3397	1.0986	2.9957	3.6889
<i>Inst</i>	40,825.0000	0.4260	0.2484	0.0010	0.4362	0.9230
<i>ROE1</i>	40,825.0000	0.0488	0.1632	−2.4383	0.0677	0.3516
<i>Growth</i>	40,825.0000	0.3548	1.0364	−0.9284	0.1207	17.1073
<i>Rec</i>	40,825.0000	0.1240	0.1030	0.0000	0.1026	0.5063
<i>Quick</i>	40,825.0000	2.2254	2.7916	0.1487	1.3209	33.8415
<i>Dual</i>	40,825.0000	0.3082	0.4617	0.0000	0.0000	1.0000
<i>Indep</i>	40,825.0000	0.3758	0.0529	0.2857	0.3636	0.6000
<i>Board</i>	40,825.0000	2.1150	0.1969	1.6094	2.1972	2.7081
<i>Mshare</i>	40,825.0000	0.1494	0.2021	0.0000	0.0170	0.7057

4.2. Baseline Regression Analysis

This article first examined the impact of enterprises' attention to biodiversity on their sustainable development performance. Table 3 reports the baseline regression results. Column (1) shows the situation without considering control variables. The regression coefficient of Bio is 0.0020, and it is significant at the 1% level, preliminarily proving that there is a significant positive correlation between enterprises' attention to biodiversity and their sustainable development performance; Columns (2) and (3) consider a series of control variables. The regression coefficients of Bio are 0.0015 and 0.0026, respectively; in Column (4), after controlling for a series of control variables as well as year and industry fixed effects, the regression coefficient of Bio is 0.0018, and it remains significantly positive at the 1% level. In Column (5), we replace the core explanatory variable with $Bio1$, defined as the ratio of biodiversity-related sentences to the total number of biodiversity sentences contained in the current-year annual report. The estimated coefficient remains significantly positive. These results indicate that the more attention enterprises pay to biodiversity, the higher their sustainable development performance, further supporting the assumption in H1 mentioned above.

Table 3. Baseline Regression Results.

Variables	(1)	(2)	(3) SusDev1	(4)	(5)
Bio	0.0020 *** (12.6178)	0.0015 *** (10.0595)	0.0026 *** (16.7851)	0.0018 *** (11.5781)	
Bio1					0.4234 *** (5.2226)
Controls	NO	YES	YES	YES	YES
Constant	0.3740 *** (185.1553)	0.2666 *** (7.6699)	0.1406 *** (4.3545)	0.2176 *** (6.7166)	0.1588 *** (4.3256)
Industry FE	YES	YES	NO	YES	YES
Year FE	YES	NO	YES	YES	YES
Observations	40,825	40,825	40,825	40,825	40,825
Adjusted R-squared	0.1196	0.0930	0.1349	0.1638	0.1742

Robust standard errors clustered at the firm level, with t-statistics reported in parentheses. *** denote significance at the 1% level.

4.3. Robustness Test

To verify the robustness of the benchmark regression, this article conducts four additional regression tests by replacing the dependent variable, eliminating specific time periods, eliminating municipalities, and adding regional control variables. The first objective is to prevent different calculation methods from affecting the relationship between the attention of enterprises to biodiversity and their sustainable development performance. This article follows the approach of Chen Ding et al. (2024) [37] and uses the entropy weight method to weight the three dimensions of economic performance (*ROA*), environmental performance (*ENV*), and social performance (*SOC*), and it re-constructs the comprehensive index of enterprise sustainable development performance (*SusDev2*). The entropy weight values of each variable index of sustainable development performance are shown in Table 4. The regression results are presented in Table 5, Column (1), and the regression coefficient of *Bio* is 0.0012, which is significant at the 1% level, consistent with the above baseline regression results. Secondly, considering that the COVID-19 pandemic might have had an external impact on the business operations and sustainable development performance of enterprises, this article chose to exclude the data from 2020 and beyond and conducted a new regression analysis. The results in Column (2) show that the regression coefficient of *Bio* is 0.0022 and is statistically significant at the 1% level, indicating that the COVID-19 pandemic did not substantially interfere with the basic conclusion of this study. Thirdly, the economic structure and policy environment of the municipalities directly under the Central Government may differ significantly from those of other regions, thereby affecting the research results. Therefore, this article excluded the samples from the municipalities directly under the Central Government and conducted a regression analysis again. Column (3) shows that the regression coefficient of *Bio* is 0.0019 and is statistically significant at the 1% level. Four, in order to comprehensively control the heterogeneity among regions, additional control variables at the regional level were added to the baseline regression, including the natural logarithm of regional per capita GDP (*lngdp*), financial development level (*FD*), and tax burden level (*Tax*). As can be seen from the results in Column (4), the regression coefficient is 0.0019 and is also statistically significant at the 1% level. After conducting the aforementioned robustness tests, the regression results remain significant and are consistent with the baseline regression results, once again indicating the robustness of the conclusions of this paper.

Table 4. Sustainable Development Performance Indicator System and Entropy Weights.

Variables	Index	Measure Method	Entropy Weight
Sustainable development performance	Economic performance	Profit/Assets	0.035
	Environmental performance	The environmental score in the Huazheng ESG rating system	0.741
	Social performance	The social score in the Huazheng ESG rating system	0.224

Table 5. Robustness Test Results.

	(1)	(2)	(3)	(4)
	Replace the Dependent Variable	Excluding the Impact of the COVID-19 Pandemic	Exclude the Municipalities Directly Under the Central Government	Add Regional-Level Control Variables
Variables	<i>SusDev2</i>	<i>SusDev1</i>	<i>SusDev1</i>	<i>SusDev1</i>
Bio	0.0012 *** (12.2936)	0.0022 *** (11.2470)	0.0019 *** (11.0301)	0.0019 *** (10.8249)
Ingdp				0.0027 (0.6133)
FD				0.0025 (0.6702)
Tax				−0.2356 (−1.4225)
Controls	YES	YES	YES	YES
Constant	0.3738 *** (17.9749)	0.2087 *** (5.4981)	0.2347 *** (6.3663)	0.2212 *** (3.4969)
Year FE	YES	YES	YES	YES
Industry FE	NO	NO	YES	YES
Observations	40,825	28,857	32,930	31,005
Adjusted R-squared	0.2745	0.1705	0.1640	0.1617

Robust standard errors clustered at the firm level, with t-statistics reported in parentheses. *** denote significance at the 1% levels.

4.4. Endogeneity Test

To further address the potential endogeneity issues arising from reverse causality, omitted variables, or sample selection biases between enterprises' attention to biodiversity and their sustainable development performance, this article employs instrumental variable methods, propensity score matching, and Heckman's two-step approach for further testing.

Firstly, this article uses the average biodiversity attention of other firms within the same industry (*Bio_IV*) as the instrumental variable and employs the two-stage least squares method (2SLS) for regression analysis. *Bio_IV* has strong exogeneity because it is not directly influenced by the current enterprise sustainable development performance, and it is highly correlated with the current biodiversity attention index. The regression results are shown in Table 6. In Column (1) of the first-stage regression, the results indicate that the one-period-lagged biodiversity attention index (*Bio_IV*) has a significant positive impact on the current biodiversity attention index (*Bio*), with a regression coefficient of 0.2576, and is significant at the 1% level, suggesting a strong correlation between the instrumental variable and the endogenous variable. In the second-stage regression in Column (2), the predicted value from the first stage is substituted into the benchmark regression model, and the results show that the regression coefficient of *Bio* is 0.0030, and it is significantly positive at the 1% level, indicating that the promotion effect of the enterprise's biodiversity attention index on its sustainable development performance remains robust. In the first stage of the instrumental variable (IV) estimation, the Kleibergen–Paap Wald rk F statistic is 321.8346,

which far exceeds the 10% critical value of 16.38 proposed by Stock–Yogo, ruling out the weak instrumental variable problem. The p -value of the Hansen J overidentification test is greater than 0.10, so we fail to reject the null hypothesis of valid instrumental variables.

Table 6. Endogeneity Issues.

Variable	Instrumental Variable Method		PSM	Heckman	
	(1) <i>Bio</i>	(2) <i>SusDev1</i>	(3) <i>SusDev1</i>	(4) <i>SusDev1</i>	(5) <i>Bio</i>
Bio		0.0030 *** (4.3249)	0.0016 *** (10.7553)	0.0003 *** (3.2012)	
Constant	0.2576 *** (4.3452)		0.2285 *** (6.8528)	0.3326 *** (14.6447)	0.3425 *** (60.9531)
IMR				−0.1414 *** (−24.6141)	−0.5696 ** (−2.4477)
Controls	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes
Observations	34,356	34,356	35,612	34,357	34,357
Adjusted R-squared	/	0.0478	0.1599	/	/

Robust standard errors clustered at the firm level, with t-statistics reported in parentheses. **, and *** denote significance at the 5%, and 1% levels, respectively.

To control for sample selection bias, this article further employed the propensity score matching (PSM) method. Using the Logit model, the propensity score was estimated to determine whether enterprises have a high attention to biodiversity. The control variables included enterprise age (*Firmage*), proportion of institutional investor holdings (*Inst*), return on equity (*Roe*), growth potential (*Growth*), accounts receivable ratio (*Rec*), quick ratio (*Quick*), dual roles (*Dual*), proportion of independent directors (*Indep*), board size (*Board*), and management shareholding ratio (*Mshare*). Additionally, the nearest neighbor matching method was used to match the treatment group and the control group, ensuring that the distribution of propensity scores in the two groups was similar. Regression analysis was then conducted on the matched samples. The results in Column (3) of Table 6 show that the coefficient of *Bio* is 0.0016, and it is significant at the 1% significance level, indicating that the baseline conclusion remains robust.

Furthermore, this paper employs the Heckman two-step method for testing. A Probit model is used to estimate the selection equation, with the control variables being consistent with those in the PSM method. The inverse Mills ratio (*lambda*) in the selection equation is taken as the control variable, and a regression analysis is conducted again. The results are shown in Columns (4) and (5) of Table 6. The coefficient of *Bio* is 0.0003, which is significantly positive at the 1% significance level, indicating that the positive impact of enterprises' attention to biodiversity on their sustainable development performance remains robust. These results are consistent with the baseline regression and further verify the reliability of the conclusions of this paper.

5. Further Analysis

5.1. Mediation Analysis

To examine the mediating mechanisms through which biodiversity attention affects sustainable development performance via three channels, namely, financing constraints, green technological innovation and digital transformation, this paper conducts a complete mediating effect analysis within the Baron–Kenny framework.

5.1.1. Financing Constraints

Financing constraints are the core factors that restrict enterprises' long-term value creation and sustainable development, and their alleviation can provide sufficient financial support for enterprises' green transformation, ESG construction, and technological innovation. In this regard, referring to the research of Du et al. (2023) [38], this article chooses the FC index to measure the extent of the constraints faced by enterprises in the financing process. Table 7, Column (1) reports the baseline regression results of corporate biodiversity concern (*Bio*) on sustainable development performance (*SusDev1*), with a coefficient of 0.0018 that is significant at the 1% level. Column (2) reports the regression results of corporate biodiversity concern (*Bio*) on financing constraints (*FC*). The regression coefficient of *Bio* is -0.0025 , which is significantly negative at the 1% level, indicating that the higher the corporate biodiversity concern, the lower the level of financing constraints faced. In combination with the research conclusions of Wei g and Tian (2025) [20], the alleviation of financing constraints can provide financial security for long-term strategic investments such as green R&D, environmental governance, and social responsibility investment, ultimately promoting the improvement of enterprises' sustainable development performance. Furthermore, the Sobel test statistic is 12.0659, which is significantly positive at the 1% level, indicating that financing constraints play a significant mediating role between corporate biodiversity concern and sustainable development performance. This result shows that the enhancement of corporate biodiversity concern helps to reduce financing constraints, thereby providing financial security for the improvement of enterprises' sustainable development performance.

Table 7. Mediation Analysis Results.

Variables	(1) SusDev1	(2) FC	(3) GRI	(4) Dig_tra
Bio	0.0018 *** (11.5781)	-0.0025 *** (-8.6660)	0.0015 *** (6.8400)	0.0113 *** (10.0890)
Controls	YES	YES	YES	YES
Constant	0.2176 *** (6.7166)	1.3651 *** (24.0240)	0.0919 *** (3.0345)	1.8954 *** (8.2155)
Year FE	YES	YES	YES	YES
Industry FE	YES	YES	YES	YES
Sobel Z		12.0659 ***	12.7156 ***	11.9773 ***
Observations	40,825	39,852	40,791	39,853
Adjusted R-squared	0.1638	0.4152	0.0833	0.4715

Robust standard errors clustered at the firm level, with t-statistics reported in parentheses. *** denote significance at the 1% levels.

5.1.2. Green Technology Innovation

Green technology innovation is a crucial link between corporate environmental strategy and sustainable development performance. It helps enterprises achieve a coordinated improvement in economic, environmental, and social benefits through optimizing production processes, reducing resource consumption, and developing green products. To this end, this article measures the level of green technology innovation (GRI) by the number of corporate green patent applications and tests its role in the relationship between corporate biodiversity concern and sustainable development performance. Specifically, the number of green patents applied for by enterprises each year is counted in accordance with the WIPO IPC Green Inventory classification. Patent applications, rather than granted patents, are adopted mainly because the patent-granting process involves a multi-year review period, and the use of application data can avoid truncation bias. Table 7, Column (3) reports that the regression coefficient of *Bio* is 0.0015, which is significantly positive at the 1% level, indicating that the higher the corporate biodiversity concern, the higher the

level of green technology innovation. In conjunction with the research conclusions of Yang Guanhua (2026) [16], the improvement of green technology innovation levels can effectively promote the improvement of corporate sustainable development performance. Furthermore, the Sobel test statistic is 12.7156, which is significantly positive at the 1% level, indicating that green technology innovation plays an important mediating role between biodiversity concern and sustainable development performance. This result shows that the enhancement of corporate biodiversity concern helps to promote green technology innovation in enterprises, thereby providing technical support for the improvement of corporate sustainable development performance.

5.1.3. Digital Transformation

Digital transformation is a key strategic direction for enterprises to optimize production processes, integrate resource allocation, and enhance operational efficiency, providing important technological and organizational support for the improvement of sustainable development performance. This article refers to the method of Zhao Chenyu (2021) [39] and statistically analyzes the frequency of digital-related terms in four dimensions—digital technology application, internet business model, intelligent manufacturing, and modern information system—obtaining the digital transformation indicator (*Dig_tr*). The regression results in Column 7 (4) show that the coefficient of corporate biodiversity concern (*Bio*) on digital transformation (*Dig_tra*) is 0.0113, and it is significantly positive at the 1% level, indicating that the concern for biodiversity can effectively drive the digital transformation process of enterprises. Table 8 further presents the contribution of each effect. In addition, Qing Lingli et al. (2026) [40] further confirmed that digital transformation significantly promotes the improvement of corporate sustainable financial performance by alleviating financing constraints and enhancing employee labor productivity. The Sobel test also indicates that digital transformation plays a significant mediating role between biodiversity concern and sustainable development performance. The logic of this transmission path lies in that the improvement of corporate biodiversity concern can force enterprises to optimize information management and decision-making processes and accelerate digital transformation, and the data-driven capabilities and operational efficiency advantages it endows provide strong support for the coordinated growth of economic, environmental, and social benefits.

Table 8. Mediation Effect Decomposition.

Variables	(1) FC	(2) GRI	(3) Dig
Bio	FC −0.00248 *** (−8.62)	SusDev1 0.00152 *** (10.19)	GRI 0.00147 *** (6.86)
Mediating Variable		SusDev1 −0.08233 *** (−13.26)	SusDev1 0.00166 *** (10.99)
Total Effect			Dig 0.01105 *** (9.91)
Controls	YES	YES	SusDev1 0.00175 *** (11.53)
Year FE	YES	YES	Dig 0.00175 *** (11.53)
Industry FE	YES	YES	SusDev1 0.00166 *** (10.99)
Indirect Effect		0.000204	Dig 0.01105 *** (9.91)
Sobel Z		7.23 ***	SusDev1 0.00161 *** (10.47)
Observations	40,658	39,852	40,791

Robust standard errors clustered at the firm level, with *t*-statistics reported in parentheses. *** denote significance at the 1% levels.

5.2. Heterogeneity Analysis

5.2.1. Degree of Industrial Pollution

Heavy-polluting industries typically face stricter environmental regulations and public supervision, and enterprises need to bear higher environmental compliance costs and social responsibility pressures. Therefore, a focus on non-financial information such as biodiversity may be more likely to translate into improved sustainable development performance. By contrast, non-heavy-polluting industries have relatively lower environmental sensitivity, and the marginal effect of related concerns may be weaker. This article divides the sample into heavy-polluting industries and non-heavy-polluting industries for group regression, as shown in Columns (1) and (2) of Table 9. In the heavy-polluting industry group, the regression coefficient of corporate biodiversity concern (*Bio*) on sustainable development performance (*SusDev1*) is 0.0023, which is significantly positive at the 1% level; in the non-heavy-polluting industry group, the coefficient of *Bio* is 0.0018, which is also significantly positive at the 1% level. The Chow test results indicate a significant difference between the two groups. It can be seen that the role of biodiversity concern in promoting sustainable development performance is more prominent in heavy-polluting industries, which may be because heavy-polluting enterprises face greater environmental regulatory pressure and stakeholder supervision, which makes their attention to biodiversity issues more likely to be incorporated into substantial management practices and thereby brings about more significant performance improvements.

Table 9. Heterogeneity Regression Results.

	(1) Severely Polluting Industries	(2) Non-Polluting Industry	(3) High-Tech Enterprise	(4) Non-High-Tech Enterprise
Variables	SusDev1	SusDev1	SusDev1	SusDev1
Bio	0.0023 *** (7.7912)	0.0018 *** (10.0312)	0.0014 *** (7.0511)	0.0019 *** (8.8882)
Controls	YES	YES	YES	YES
Constant	0.3273 *** (4.6183)	0.1940 *** (5.3804)	0.1649 *** (3.8373)	0.2700 *** (6.2432)
Year FE	YES	YES	YES	YES
Industry FE	YES	YES	YES	YES
Chow test		37.33		37.14
<i>p</i> -value		0.0000		0.0000
Observations	8961	31,864	21,328	19,497
Adjusted R-squared	0.1361	0.1661	0.1600	0.1961

	(1) Regulatory Industry	(2) Unregulated Industry	(3) High-Market-Share Enterprise	(4) Low-Market-Share Enterprises
Variables	SusDev1	SusDev1	SusDev1	SusDev1
Bio	0.0019 *** (7.3338)	0.0016 *** (8.8201)	0.0018 *** (9.6401)	0.0014 *** (5.7858)
Controls	YES	YES	YES	YES
Constant	0.2351 *** (3.8791)	0.2303 *** (6.0702)	0.2596 *** (5.9733)	0.2922 *** (6.6978)
Year FE	YES	YES	YES	YES
Industry FE	YES	YES	YES	YES
Chow test		25.86		168.72
<i>p</i> -value		0.0000		0.0000
Observations	9301	31,524	20,898	19,925
Adjusted R-squared	0.2202	0.1576	0.1680	0.1740

Robust standard errors clustered at the firm level, with t-statistics reported in parentheses. *** denote significance at the 1% levels.

5.2.2. Enterprise Technical Properties

High-tech enterprises and non-high-tech enterprises show significant differences in their innovation capability, resource base, and environmental management capability, which may lead to different performance transformation paths in terms of biodiversity concern. This article divides the samples into high-tech and non-high-tech enterprises for separate regression, as shown in Columns (3) and (4) of Table 9. In the high-tech enterprise group, the regression coefficient of *Bio* is 0.0014, which is significantly positive at the 1% level; in the non-high-tech enterprise group, the coefficient of *Bio* is 0.0019, which is also significantly positive at the 1% level. The Chow test also shows a significant difference between the two groups of samples. Interestingly, the positive impact of biodiversity attention on sustainable development performance is more pronounced in non-high-tech firms, which can be explained via two mechanisms. The first is the ceiling effect: high-tech enterprises boast a solid ESG foundation and sophisticated environmental management systems, which leaves limited room for performance improvement. Accordingly, the marginal benefits brought by biodiversity information disclosure remain relatively low. Second, high-tech industries are subject to stringent external supervision from multiple stakeholders, and their environmental disclosures mostly serve routine compliance purposes, which hardly helps them build strategic competitive advantages. By contrast, non-high-tech firms are more likely to gain differentiated performance dividends by engaging in biodiversity-related initiatives. These rationalizations lead to a research hypothesis that the baseline ESG level exerts a negative moderating effect. Nevertheless, constrained by the limitations of Bloomberg ESG rating data, this paper does not conduct corresponding empirical tests and leaves this topic for future research.

5.2.3. Degree of Industry Regulation

Differences in regulatory levels among industries exist in terms of policy constraints, compliance requirements, and the intensity of external supervision, which may affect the efficiency of the transformation of corporate biodiversity concerns into sustainable development performance. This article conducts a grouped regression based on whether the industry belongs to typical regulated industries such as electricity, oil, and chemicals, and the results are shown in Columns (1) and (2) of Table 9. In the regulated industry group, the regression coefficient of *Bio* is 0.0019, which is significantly positive at the 1% level; in the non-regulated industry group, the coefficient of *Bio* is 0.0016, which is also significantly positive at the 1% level. The value of the Chow test is 25.86, and the *p*-value is 0.0000, indicating a significant difference between the two groups of coefficients. The influence coefficient of biodiversity concern in the regulated industry group is greater, indicating that in industries with stricter supervision and stronger policy constraints, corporate attention to biodiversity issues is more easily absorbed by institutionalized environmental management systems and is thereby more effectively transformed into the improvement of sustainable development performance.

5.2.4. Corporate Market Share

Market share reflects a company's competitive position in the industry and its ability to acquire resources. Companies with different market shares may adopt differentiated response strategies when facing external environmental issues. This article divides the samples into high-market-share companies and low-market-share companies based on the median market share, and the grouped regression results are shown in Columns (3) and (4) of Table 9. In the high-market-share company group, the regression coefficient of *Bio* is 0.0018, which is significantly positive at the 1% level; in the low-market-share company group, the coefficient of *Bio* is 0.0014, which is also significantly positive at

the 1% level. The Chow test indicates a significant difference between the coefficients of the two groups. The results show that the promoting effect of high-market-share companies is stronger, which may be because companies with a higher market share have more abundant resources and stronger social influence and can more effectively integrate biodiversity concerns into corporate strategy and management practices, which, thus, produces a stronger effect on performance improvement in sustainable development.

5.2.5. Interaction Term Model

Prior to the grouped regression analysis, this paper first estimates an interaction term model using the full sample. Specifically, we introduce the interaction term between the biodiversity indicator (*Bio*) and the heavily polluting industry dummy variable (*Pollute*), namely, $Bio \times Pollute$, into the baseline regression model, while controlling for the main effect of *Pollute*. Meanwhile, we construct the interaction term $Bio \times SOE$ between *Bio* and the ownership nature dummy variable (*SOE*) to conduct heterogeneity tests. As shown in Table 10, the core research conclusions remain robust after incorporating these interaction effects.

Table 10. Regression Results of the Interaction Term Model.

Variables	(1) Severely Polluting Industries SusDev1	(2) High-Tech Enterprise SusDev1	(3) Regulatory Industry SusDev1	(4) High-Market- Share Enterprise SusDev1
<i>Bio</i>	0.00192 *** (11.00)	0.00195 *** (9.59)	0.00141 *** (8.01)	0.00168 *** (7.85)
$Bio \times Group$	−0.00062 ** (−2.07)	0.00042 *** (4.46)	0.00130 *** (4.29)	0.00019 ** (2.25)
<i>Group</i>	YES	YES	YES	YES
Controls	YES	YES	YES	YES
Year FE	YES	YES	YES	YES
Industry FE	YES	YES	YES	YES
Observations	40,791	40,825	40,825	40,825

Robust standard errors clustered at the firm level, with t-statistics reported in parentheses. **, and *** denote significance at the 5%, and 1% levels, respectively.

5.3. Economic Consequences Test

Corporate resilience reflects a company's ability to adapt and recover in the face of external shocks, and it is the core foundation for the company to achieve stable operations and long-term sustainable development. Regarding performance in corporate sustainable development, as a comprehensive reflection of multi-dimensional values covering the economy, the environment, and society, whether its improvement can effectively enhance corporate resilience is an important dimension in testing the value of sustainable development. This paper adopts the entropy method to comprehensively measure organizational resilience. Following the research of Wu and Feng (2022) [41], a corporate resilience indicator is constructed from two dimensions: growth and volatility. The growth dimension is measured by the cumulative sales revenue growth over three years, while the volatility dimension is captured using the standard deviation of monthly stock returns within one year. The comprehensive corporate resilience score (Resilience) is then calculated through weighted summation via the entropy weighting method. Specifically, the corporate resilience index (Resilience) in this study is synthesized by assigning weights using the entropy method to two Min–Max normalized variables: the cumulative sales growth rate over the past three years and the reciprocal of annual stock return volatility. The regression results are shown in Table 11, and the regression coefficient of corporate sustainable development

performance (*SusDev1*) on corporate resilience (*Resilience*) is 0.0157, and it is significantly positive at the 1% level, indicating that the improvement of corporate sustainable development performance significantly enhances corporate resilience. This result reveals that the improvement of corporate sustainable development performance not only helps the company achieve stable growth at the economic level but also can enhance corporate resilience through positive practices in the environmental and social dimensions, help the company accumulate social reputation, enhance stakeholder trust, and optimize resource allocation efficiency, thereby enhancing the company's ability to resist external shocks. When facing market fluctuations, policy adjustments, or sudden crises, companies with higher sustainable development performance often have stronger risk resistance and faster recovery speeds. As the government work report for 2026 explicitly proposes, "Accelerate the comprehensive green transformation, take carbon peak and carbon neutrality as the traction, coordinate the promotion of carbon reduction, pollution reduction, greening, and growth, and enhance the momentum of green development." Improving corporate sustainable development performance, which guides companies to invest resources in green innovation, social responsibility, and long-term value creation, is not only an important measure for consolidating corporate core competitiveness but also the fundamental path to enhance corporate resilience and ensure its sustainable development through cycles. In addition, this paper identifies a significantly positive correlation between sustainable development performance and corporate resilience, which may reflect a bidirectional and mutually reinforcing virtuous-cycle mechanism. Future research can adopt exogenous shocks or quasi-experimental designs to further clarify the causal direction between these two variables.

Table 11. Economic Consequences Test ¹.

Variables	(1) Resilience
SusDev1	0.0157 *** (9.6341)
Control Variables	YES
Constant	0.4482 *** (50.5996)
Year FE	YES
Industry FE	YES
Observations	31,525
Adjusted R-squared	0.9842

¹ The relatively high adjusted R-squared in this table can be attributed to mechanical correlation resulting from data homology between the constituent indicators of the resilience index and the financial control variables included in the model. Accordingly, the adjusted R-squared is not appropriate for evaluating the explanatory power of the core explanatory variable. Robust standard errors clustered at the firm level, with *t*-statistics reported in parentheses. *** denote significance at the 1% levels.

6. Conclusions and Enlightenment

The article takes Chinese A-share listed companies from 2010 to 2023 as a sample and empirically tests the impact of corporate biodiversity concern on their sustainable development performance and its transmission mechanism. The research results show that corporate biodiversity concern significantly improves their sustainable development performance, which is mainly realized through three mechanisms: alleviating financing constraints, promoting green technological innovation, and accelerating digital transformation. Further heterogeneity analysis indicates that this promoting effect is more significant in heavily polluting industries, non-high-tech enterprises, regulated industries, and enterprises with a high market share. In addition, the economic consequence test finds that the improvement of sustainable development performance can significantly enhance corporate

resilience and help enterprises achieve faster recovery and stable growth in the face of external shocks.

Based on the above research conclusions, this article proposes the following insights: First, strengthen the disclosure of biodiversity information, and build the institutional foundation for corporate sustainable development. Enterprises should actively integrate biodiversity into the framework of environmental responsibility and strategic decision-making, improve the relevant information-disclosure mechanism, and convey positive environmental responsibility signals to the market, which can thereby reduce financing costs, expand green financing channels, and provide stable financial support for sustainable development. Regulatory agencies should accelerate the formulation of unified biodiversity information-disclosure standards, guide enterprises to improve the quality of non-financial information disclosure, and enhance the capital market's ability to identify and support corporate green transformation. Second, promote the synergy of green technological innovation and digital transformation to lay a solid foundation for the core driving force of corporate sustainable development. Enterprises should rely on the strategic opportunities of biodiversity concerns, increase investment in green technology research and development, and promote the clean production process and efficient resource utilization, while also accelerating the integration and application of digital technologies such as the Internet of Things and big data in environmental management and green supply chains, to drive the continuous improvement of sustainable development performance through the dual drive of technological innovation and digital empowerment. At the policy level, strengthen fiscal subsidies and tax preferences for green technology research and development and digital transformation and guide resources to gather in green, intelligent, and high-value-added fields. Third, implement differentiated policy guidance to accurately enhance the sustainable development capabilities of enterprises in key areas. For heavily polluting industries, non-high-tech enterprises, regulated industries, and enterprises with a low market share, the government should strengthen the synergy of environmental regulation and policy incentives and improve the efficiency of transforming biodiversity concerns into sustainable development performance through measures such as special support, technical assistance, and targeted green financial support. At the same time, establish and improve mechanisms for entrepreneurs' confidence feedback and policy communication, enhance the effectiveness of policy transmission, and promote the resilience enhancement and value leap of various enterprises in the process of green transformation.

Author Contributions: Conceptualization, R.L. and B.Z.; methodology, R.L. and B.Z.; software, R.L. and J.D.; validation, R.L., J.D. and Z.-H.C.; formal analysis, R.L. and Z.-H.C.; investigation, R.L., J.D. and Z.-H.C.; resources, B.Z.; data curation, R.L. and J.D.; writing—original draft preparation, R.L.; writing—review and editing, R.L., B.Z., J.D. and Z.-H.C.; visualization, R.L. and Z.-H.C.; supervision, B.Z.; project administration, B.Z.; funding acquisition, B.Z. All authors have read and agreed to the published version of the manuscript.

Funding: This research was funded by the Anhui Provincial Federation of Social Sciences under the Social Science Innovation Tackling Project titled “Research on the Development Path of Intelligent, Green, and Integrated New Energy Vehicles in Anhui Driven by Digital Economy” (Grant No. 2025CX058); the Anhui Provincial Federation of Social Sciences under the Social Science Innovation Tackling Project titled “Research on the Mechanism and Path of Digital-Real Economy Integration Stimulating New Consumption in Anhui during the 15th Five-Year Plan Period” (Grant No. 2025CX062); the Hefei Municipal Philosophy and Social Science Planning Office under the 2026 Hefei Municipal Philosophy and Social Science Planning Project titled “Research on the Path of Patient Capital Empowering Key Core Technology Breakthroughs in Hefei's Strategic Emerging Industries” (Grant No. HFSKQN202636); and Hefei University under the Graduate Research and

Practice Innovation Project titled “Research on the Path of Patient Capital Supporting Key Core Technology Breakthroughs in Anhui’s Strategic Emerging Industries” (Grant No. 2025Yxscx14).

Institutional Review Board Statement: Not applicable.

Informed Consent Statement: Not applicable.

Data Availability Statement: The original contributions presented in this study are included in the article. Further inquiries can be directed to the corresponding author.

Acknowledgments: The authors would like to thank the anonymous reviewers for their insightful comments and suggestions.

Conflicts of Interest: The authors declare no conflicts of interest.

References

1. He, F.; Chen, L.; Lucey, B.M. Chinese corporate biodiversity exposure. *Financ. Res. Lett.* **2024**, *70*, 106275. [\[CrossRef\]](#)
2. Sun, W.; Mei, J.; Chen, K.; Li, Z. Biodiversity risk and value creation in emerging markets. *Financ. Res. Lett.* **2025**, *85*, 108069. [\[CrossRef\]](#)
3. Li, Y.; Liu, X.; Canil, J.; Cheong, C.S. Biodiversity risk and firm efficiency. *Financ. Res. Lett.* **2025**, *71*, 106414. [\[CrossRef\]](#)
4. Jin, W. When nature disrupts: Biodiversity risk and corporate supply chain resilience. *Financ. Res. Lett.* **2025**, *86*, 108518. [\[CrossRef\]](#)
5. Deng, X.; Zhang, P.; Wu, Y. Threat or opportunity: Biodiversity risk and corporate investment. *Financ. Res. Lett.* **2025**, *89*, 108761. [\[CrossRef\]](#)
6. Wang, B.; Kang, Q. Digital Transformation and Corporate Sustainable Development Performance. *Econ. Manag.* **2023**, *45*, 161–176. [\[CrossRef\]](#)
7. Giglio, S.; Kuchler, T.; Stroebe, J.; Zeng, X. Biodiversity risk. *Rev. Financ.* **2026**, *30*, 131–161.
8. White, T.B.; Mukherjee, N.; Petrovan, S.O.; Sutherland, W.J. Identifying opportunities to deliver effective and efficient outcomes from business-biodiversity action. *Environ. Sci. Policy* **2023**, *140*, 221–231. [\[CrossRef\]](#)
9. Smith, T.; Beagley, L.; Bull, J.; Milner-Gulland, E.J.; Smith, M.; Vorhies, F.; Addison, P.F.E. Biodiversity means business: Reframing global biodiversity goals for the private sector. *Conserv. Lett.* **2020**, *13*, e12690.
10. Bassen, A.; Buchholz, D.; Lopatta, K.; Rudolf, A.R. Biodiversity management and stock price crash risk. *Bus. Strategy Environ.* **2024**, *33*, 4788–4805. [\[CrossRef\]](#)
11. Adamolekun, G. Firm biodiversity risk, climate vulnerabilities, and bankruptcy risk. *J. Int. Financ. Mark. Inst. Money* **2024**, *97*, 102075. [\[CrossRef\]](#)
12. Tang, X.; Qin, T. Construction of the Index of Biodiversity Information Disclosure of Chinese Enterprises and Its Financing Effect. *Biodiversity* **2025**, *33*, 107–122. [\[CrossRef\]](#)
13. Nie, C.; Zhang, C. Low-carbon production and corporate biodiversity concern: Evidence from Chinese manufacturing firms. *Financ. Res. Lett.* **2025**, *77*, 107036. [\[CrossRef\]](#)
14. Zhang, C.; Zhang, Z.; Tang, Z. Executive green perception, green technology innovation and enterprise biodiversity exposure: Based on simultaneous equation model. *Int. J. Environ. Sci. Technol.* **2026**, *23*, 266. [\[CrossRef\]](#)
15. Zhou, Z.; Yuan, Z. Does corporate ESG performance affect stock liquidity? *Res. Financ. Trade* **2023**, *34*, 64–77. [\[CrossRef\]](#)
16. Yang, G. Research on the Impact Mechanism of Green Technological Innovation on Corporate Sustainable Development Performance—Based on the Perspective of Value Network. *Sci. Technol. Prog. Policy* **2026**, *43*, 82–91. [\[CrossRef\]](#)
17. Dong, X. Research on the Impact of Digital Transformation on Corporate Sustainable Development—The Mediating Effect of Green Technological Innovation and Green Management Innovation. *Sci. Technol. Prog. Policy* **2026**, *43*, 100–109.
18. Liu, Z.; Kong, L.; Zhang, J. Green Finance and Biodiversity: An Investigation Based on Chinese Bird Watching Data. *Economics (Quarterly)* **2025**, *25*, 565–580. [\[CrossRef\]](#)
19. Wu, Z.; Li, X. Green Transformation and Corporate Sustainable Development Performance: Evidence from Manufacturing Listed Companies in Shanghai and Shenzhen A-share Markets. *Econ. Syst. Reform* **2024**, *42*, 103–111.
20. Wei, T.; Tian, H. Analysis and Countermeasures on the Impact of Asset Structure Mismatch on Corporate Sustainable Development Performance. *Macrocon. Res.* **2025**, *45*, 98–116. [\[CrossRef\]](#)
21. Wang, B.; Kang, Q. Digital Finance and Corporate Sustainable Development Performance: Heterogeneity Characteristics, Micro-Mechanisms, and Macroeconomic Regulatory Role. *Nankai Econ. Res.* **2024**, *40*, 162–176. [\[CrossRef\]](#)
22. Sun, Y.; Zhang, X. Beyond Risk Buffer: The Impact of Financial Flexibility on Corporate Sustainable Development Performance—Empirical Evidence from Chinese A-share Listed Companies. *South China Financ.* **2025**, *46*, 3–19.

23. Yang, K.; Xiang, W. Research on the Impact of Supply Chain Digitization on Corporate Sustainable Development Performance. *Ind. Technol. Econ.* **2026**, *45*, 110–119.
24. Wang, G.; Li, W.; Weili. New-quality Productivity, Green Innovation, and Corporate Sustainable Development Performance. *Sci. Decis.-Mak.* **2025**, *31*, 124–141.
25. Yang, G.; Hou, X.; Fan, X. Digital Transformation, Green Innovation, and Corporate Sustainable Development Performance—The Moderating Role of Environmental Dynamism. *Technol. Econ.* **2026**, *45*, 77–93.
26. Xu, P.; Fang, S. Advanced Human Capital, Credit Resource Misallocation, and Corporate Sustainable Development Performance. *Financ. Res. Lett.* **2025**, *92*, 109342. [[CrossRef](#)]
27. Chang, K.; Wei, S.; Wei, G. Impact of Green Transformation on Corporate Sustainable Development Performance in China. *Sage Open* **2025**, *15*, 21582440251404775. [[CrossRef](#)]
28. Du, M.; Antunes, J.; Wanke, P.; Chen, Z. Ecological efficiency assessment under the construction of low-carbon city: A perspective of green technology innovation. *J. Environ. Plan. Manag.* **2022**, *65*, 1727–1752.
29. Kilinc-Ata, N.; Proskuryakova, L.N. Assessing the influence of innovation and digitalization on carbon footprint across the Middle East, North Africa, and South Caucasus regions. *Nat. Resour. Forum* **2026**, *early view*. [[CrossRef](#)]
30. Lin, M.; Wang, F.; Zhang, Y. Research on the impact of data-driven dynamic capabilities on the sustainable development performance of Chinese manufacturing enterprises. *Financ. Res. Lett.* **2025**, *86*, 108628. [[CrossRef](#)]
31. Chen, R.; Li, Z.; Yang, G.; Li, W.; Guo, Z. Exploring how artificial intelligence capabilities impact corporate sustainability performance: Insights from Chinese manufacturing firms. *Technovation* **2026**, *149*, 103429.
32. Cao, X.; Zhang, W. The Impact of Digital Transformation on the Sustainable Development Performance of Manufacturing Enterprises—Based on the Moderating Effect of Media Attention. *J. Cent. South Univ. (Soc. Sci. Ed.)* **2025**, *31*, 98–112.
33. Liang, W.; Han, Y. A Study on the Mechanism of Digital Infrastructure Improving Corporate Sustainable Development Performance: Empirical Evidence from Chinese Listed Companies. *Ind. Technol. Econ.* **2025**, *44*, 79–89.
34. Zhou, X.; Lin, D. Impact of the environmental protection law on corporate biodiversity risk attention—An empirical analysis based on data of Chinese listed companies. *Financ. Res. Lett.* **2025**, *86*, 108663. [[CrossRef](#)]
35. Pan, C.; Meng, X.; Huang, Y. The impact of fintech on corporate sustainable development performance: Evidence from Chinese listed companies. *Res. Int. Bus. Financ.* **2025**, *81*, 103199. [[CrossRef](#)]
36. Zhou, Z.; Wang, S.; Dong, F. Response to Climate Policy Uncertainty and Financial Asset Allocation of Real Entity Enterprises. *Financ. Res.* **2025**, *78*, 95–113.
37. Chen, D.; Wu, Y.; Cheng, Y. A Study on the Impact of Executive Compensation Gap on Corporate Sustainable Development Performance. *J. Xi'an Univ. Pet. (Soc. Sci. Ed.)* **2024**, *33*, 71–80.
38. Du, J.; Teng, D.; Yang, Y. Can institutional investor holdings stimulate corporate climate transition risk information disclosure?—An empirical analysis based on corporate annual report texts. *Mod. Financ. (J. Tianjin Univ. Financ. Econ.)* **2023**, *43*, 56–77. [[CrossRef](#)]
39. Zhao, C. Digital Development and Service Transformation—Empirical Evidence from Listed Manufacturing Companies. *Nankai Bus. Rev.* **2021**, *24*, 149–163.
40. Qing, L.; Tang, J.; Zhou, Y. Digital Transformation and Corporate Sustainable Financial Performance: The Moderating Role of the Chief Digital Officer. *Financ. Pract.* **2026**, *47*, 91–100.
41. Wu, X.; Feng, X. The Impact of Operational Redundancy on Organizational Resilience under VUCA Scenario—The Moderating Role of Continuous Innovation Ability. *J. Syst. Manag.* **2022**, *31*, 1150–1161.

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