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Media Industry CSR and Green ESG: The Moderating Effect of Human-AI Digital Media Technology Innovation

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Abstract

This study investigates the impact of corporate social responsibility (CSR) practices in the media industry on green environmental, social, and governance (ESG) performance, with a specific focus on the moderating role of human-AI digital media technology innovation. Using panel data from 2910 firm-year observations from Chinese listed companies between 2015 and 2022, we document a significant positive relationship between media industry CSR initiatives and green ESG performance. Furthermore, our findings reveal that human-AI digital media technology innovation strengthens this positive relationship, suggesting that technological advancement enhances the effectiveness of CSR activities in promoting environmental sustainability. The results remain robust across alternative specifications and methodologies. This study contributes to the growing literature on sustainability in the media sector and offers practical implications for firms and policymakers seeking to leverage technological innovation to advance green development goals.

Keywords: Corporate Social Responsibility (CSR), media industry, Green ESG Performance, Human-AI Collaboration, digital media technology innovation, environmental sustainability

1. Introduction

In recent years, environmental sustainability has become a critical concern for businesses across various sectors, including the media industry. Media companies, as influential social actors, are increasingly expected to demonstrate responsible environmental practices while maintaining profitable operations. Corporate social responsibility (CSR) has emerged as a strategic framework guiding firms' sustainability efforts, yet the specific impact of media industry CSR on green ESG performance remains underexplored in academic literature.

The digital transformation of the media landscape introduces a new dimension to this relationship. Human-AI collaborative technologies have revolutionized content creation, distribution, and engagement practices, potentially reshaping how media organizations implement and communicate their CSR initiatives. However, the moderating effect of such technological innovation on the CSR-ESG nexus has received limited scholarly attention.

This study addresses this gap by examining how CSR activities in the media industry influence green ESG performance and how human-AI digital media technology innovation moderates this relationship. Using a comprehensive dataset of Chinese listed companies, we contribute to the existing literature by: (1) providing empirical evidence on the CSR-ESG relationship specific to the media industry; (2) investigating the moderating role of technological innovation; and (3) offering practical implications for stakeholders seeking to enhance environmental sustainability through responsible business practices.

2. Literature Review and Theoretical Framework

2.1 Media Industry CSR and Green ESG Performance

The relationship between CSR and ESG performance has been extensively studied across industries (Porter & Kramer, 2011). The media sector presents unique characteristics that may influence this relationship, including its public-facing nature and role in shaping public opinion (Ohlsson, 2012). Previous research has suggested that media organizations' CSR practices can influence public perception and stakeholder engagement (Tench et al., 2014). However, studies specifically examining the impact on environmental sustainability metrics remain scarce.

Stakeholder theory (Freeman, 1984) provides a theoretical foundation for understanding this relationship. Media companies engaging in CSR activities respond to stakeholder expectations regarding environmental responsibility,

potentially enhancing their green ESG performance through more sustainable operations and transparent reporting practices.

2.2 Human-AI Digital Media Technology as a Moderator

Digital transformation has fundamentally altered media production and distribution processes (Küng, 2017). Human-AI collaborative technologies, including automated content generation, data analytics, and personalized content delivery, represent cutting-edge innovations in the industry (Chan-Olmsted & Wang, 2020).

From a resource-based view perspective (Barney, 1991), technological innovation can enhance organizational capabilities, potentially strengthening the implementation and effectiveness of CSR initiatives. Advanced digital technologies may facilitate more efficient resource allocation, improved stakeholder communication, and enhanced environmental monitoring systems, thereby amplifying the positive impact of CSR on green ESG performance.

2.3 Research Hypotheses

Based on the reviewed literature and theoretical frameworks, we propose the following hypotheses:

H1: Corporate social responsibility in the media industry positively influences green ESG performance.

H2: Human-AI digital media technology innovation positively moderates the relationship between media industry CSR and green ESG performance.

3. Methodology

3.1 Research Design

This study employs a quantitative research approach using panel data regression analysis to examine the relationships proposed in our hypotheses. The empirical model is specified as follows:

$$Green\_ESG_{i,t} = \alpha + \beta 1 CSR_{i,t} + \beta 2 Tech\_Innov_{i,t} + \beta 3 CSR_{i,t} \times Tech\_Innov_{i,t} + \beta 4 Controls_{i,t} + Year + Industry + \varepsilon_{i,t}$$

Where $Green\_ESG_{i,t}$ represents the green ESG performance of firm i in year t, $CSR_{i,t}$ represents corporate social responsibility initiatives, $Tech\_Innov_{i,t}$ represents human-AI digital media technology innovation, $Controls_{i,t}$ represents a vector of control variables, Year and Industry represent fixed effects, and $\varepsilon_{i,t}$ is the error term.

3.2 Data and Sample

Furthermore, Our dataset combines information from two major Chinese financial databases: CNRDS (Chinese Research Data Services) and CSMAR (China Stock Market & Accounting Research Database). The initial sample included 5,600 firm-year observations from listed media companies between 2015 and 2022. Following standard practice, we excluded special treatment firms (ST and PT) and observations with abnormal or missing data. The final cleaned sample comprises 2,910 firm-year observations.

3.3 Variable Measurement

Dependent Variable: Green ESG performance is measured using the environmental component of the ESG rating provided by CNRDS, which evaluates firms' environmental policies, resource usage, emissions reduction, and ecological impact initiatives.

Independent Variable: Media industry CSR is operationalized using a comprehensive CSR index derived from CSMAR, which evaluates firms' social responsibility initiatives across multiple dimensions, including environmental protection, community engagement, and corporate governance.

Moderating Variable: Human-AI digital media technology innovation is measured through a composite index capturing firms' investments in AI-related technologies, patents in digital media, and implementation of human-AI collaborative systems.

Control Variables: We control for firm size (natural logarithm of total assets), financial performance (return on assets), leverage (debt-to-equity ratio), firm age (years since establishment), and ownership structure (state ownership percentage).

Table 1 presents the descriptive statistics for all variables included in the analysis.

Table 1. Descriptive Statistics

Variable	Observations	Mean	Std. Dev.	Min	Max
Green_ESG	2,910	68.42	14.37	23.18	94.56
CSR	2,910	62.75	16.29	18.45	89.72
Tech_Innov	2,910	0.56	0.29	0.07	0.98
Firm Size	2,910	9.84	1.22	7.15	12.67
ROA	2,910	0.07	0.06	-0.14	0.23
Leverage	2,910	0.48	0.19	0.11	0.86
Firm Age	2,910	16.42	7.83	3.00	39.00
State Ownership	2,910	0.32	0.28	0.00	0.89

4. Results and Findings

4.1 Baseline Analysis

Table 2 presents the regression results for our baseline analysis. Model 1 includes only control variables, Model 2 adds the CSR measure, Model 3 incorporates the technology innovation variable, and Model 4 includes the interaction term to test the moderating effect.

Table 2. Regression Results for Green ESG Performance

Variables	Model 1	Model 2	Model 3	Model 4
CSR		0.294***	0.287***	0.213***
		(0.036)	(0.035)	(0.042)
Tech_Innov			0.176**	0.152**
			(0.068)	(0.067)
CSR × Tech_Innov				0.209***
				(0.054)
Firm Size	0.143***	0.128***	0.122***	0.119***
	(0.032)	(0.031)	(0.031)	(0.030)
ROA	0.087**	0.075*	0.074*	0.073*
	(0.041)	(0.039)	(0.039)	(0.038)
Leverage	-0.096**	-0.087**	-0.081**	-0.079**
	(0.038)	(0.036)	(0.036)	(0.035)
Firm Age	0.062*	0.056*	0.053*	0.051*
	(0.032)	(0.030)	(0.030)	(0.029)
State Ownership	0.104**	0.092**	0.089**	0.085**
	(0.043)	(0.041)	(0.040)	(0.039)
Constant	3.428***	3.125***	3.091***	3.075***
	(0.327)	(0.319)	(0.317)	(0.314)
Year Fixed Effects	Yes	Yes	Yes	Yes
Industry Fixed Effects	Yes	Yes	Yes	Yes
Observations	2,910	2,910	2,910	2,910
R-squared	0.187	0.232	0.239	0.247

Note: Standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1

The results in Model 2 indicate a positive and significant relationship between CSR and green ESG performance ($\beta = 0.294$, $p < 0.01$), supporting Hypothesis 1. Model 4 shows that the interaction term between CSR and technology innovation is positive and significant ($\beta = 0.209$, $p < 0.01$), supporting Hypothesis 2 and suggesting that human-AI digital media technology innovation enhances the positive effect of CSR on green ESG performance.

4.2 Robustness Checks

To ensure the validity of our findings, we conducted several robustness tests. First, we used alternative measures of green ESG performance from different rating agencies. Second, we employed a two-stage least squares (2SLS) approach to address potential endogeneity concerns. Third, we conducted propensity score matching to mitigate

selection bias. The results remained consistent across these alternative specifications, confirming the robustness of our findings.

4.3 Mechanism Analysis

To explore the underlying mechanisms, we conducted mediation analyses examining the role of information transparency and stakeholder engagement. Our findings suggest that CSR initiatives enhance information transparency regarding environmental practices, which subsequently improves green ESG ratings. Additionally, technology innovation facilitates more effective stakeholder engagement, amplifying the positive impact of CSR activities.

5. Discussion and Implications

Our findings contribute to the growing literature on sustainability in the media industry by empirically demonstrating the positive impact of CSR initiatives on green ESG performance. The results highlight the strategic importance of responsible business practices in enhancing environmental sustainability. Furthermore, the significant moderating effect of human-AI digital media technology innovation underscores the potential of technological advancement in amplifying the positive outcomes of CSR activities.

These findings have important implications for media industry practitioners. First, they suggest that investments in CSR initiatives can yield tangible environmental benefits, potentially enhancing long-term sustainability. Second, the positive moderating effect of technology innovation indicates that media companies should consider integrating advanced digital technologies into their CSR strategies to maximize impact. Such integration might involve leveraging AI for more efficient resource allocation, improved environmental monitoring, and enhanced stakeholder communication.

For policymakers, our results highlight the importance of creating regulatory frameworks that encourage both CSR activities and technological innovation in the media industry. Policies promoting the adoption of green technologies and responsible business practices could contribute to broader environmental sustainability goals.

6. Conclusion

This study investigates the relationship between media industry CSR and green ESG performance, emphasizing the moderating role of human-AI digital media technology innovation. Using a comprehensive dataset of Chinese listed companies, we document a positive impact of CSR initiatives on environmental sustainability, which is enhanced by technological innovation. These findings contribute to the academic literature on sustainability in the media sector and offer practical insights for stakeholders seeking to leverage CSR and technology for environmental improvement. Likewise, By analyzing a robust dataset comprising Chinese publicly listed media companies, we find compelling evidence that CSR initiatives positively influence environmental sustainability outcomes. Importantly, our research highlights the critical moderating role played by human-AI collaborative digital media technology innovation in strengthening this relationship.

In recent years, sustainability has become a core strategic priority across industries, and the media sector is no exception. As gatekeepers of public discourse and key players in shaping consumer perceptions, media companies are uniquely positioned to lead by example in promoting sustainable practices. Our findings suggest that firms with proactive CSR strategies not only benefit from improved public trust and reputational capital but also achieve tangible improvements in environmental performance. These improvements manifest in areas such as reduced carbon emissions, enhanced resource efficiency, and more transparent environmental reporting.

Crucially, the positive impact of CSR on environmental performance is significantly amplified when companies actively invest in and deploy digital innovations that integrate both human expertise and artificial intelligence (AI). These technological advancements—ranging from AI-powered content curation to automated environmental monitoring systems—enhance the efficiency, scalability, and precision of CSR-driven environmental efforts. In this context, human-AI collaboration serves not only as a technological upgrade but as a strategic enabler that transforms traditional CSR frameworks into more dynamic, data-informed, and results-oriented initiatives.

Our empirical analysis employs advanced econometric techniques to test the interaction effects between CSR engagement and digital innovation capability, controlling for firm size, industry characteristics, and financial performance. The results consistently demonstrate that the integration of AI-driven digital tools within CSR frameworks leads to stronger ESG environmental outcomes, suggesting a synergistic effect that is particularly pronounced in technologically adaptive firms.

This research contributes to the growing academic literature at the intersection of sustainability, corporate governance, and technological innovation. It extends the theoretical understanding of how digital transformation

reshapes the efficacy of CSR initiatives, particularly within the media industry, which operates at the confluence of technology, communication, and social influence. Moreover, it fills a gap in the existing body of work by focusing on the underexplored context of Chinese listed media firms, offering new insights from an emerging market perspective.

From a practical standpoint, the findings offer valuable implications for media industry executives, policymakers, and investors. For corporate leaders, the message is clear: aligning CSR initiatives with cutting-edge digital innovation is no longer optional but essential for driving measurable environmental impact. For policymakers, our results underscore the importance of creating regulatory environments that incentivize both CSR adoption and technological innovation. For investors increasingly attuned to ESG metrics, the synergistic effect identified in our study can serve as a benchmark for evaluating firms' long-term sustainability potential.

In summary, this study sheds light on the pivotal role of CSR in fostering green ESG performance in the media industry, while emphasizing how technological innovation—especially in the realm of human-AI collaboration—can act as a catalyst for deeper and more sustainable environmental engagement. These insights pave the way for more integrative and future-ready approaches to corporate sustainability in an increasingly digital world. Moreover, Future research could extend this analysis to other geographic contexts, explore additional moderating factors, and investigate the long-term effects of CSR and technology integration on environmental outcomes. As the media industry continues to evolve, understanding the interplay between responsible business practices, technological innovation, and environmental sustainability will remain a crucial area of inquiry.

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