Advances in Consumer Research
ISSN (Print): 0098-9258
ISSN(Online): 3079-1766

Vol. 2, Issue 5 (2025) https://acr-journal.com/

The Sustainable Development Impact and Differentiation of ESG Practices in Chinese Real Estate Industry.

Deng Qili[1], Jirawan Deeprasert[2]

1 Rattanakosin International College of Creative Entrepreneurship, Rajamangala University of Technology Rattanakosin, Nakhon Pathom 73170, Thailand

Email ID : 1652110381103@rmutr.ac.th

2 Rattanakosin International College of Creative Entrepreneurship, Rajamangala University of Technology Rattanakosin, Nakhon Pathom 73170, Thailand

Email ID : jirawan.dee@rmutr.ac.th

Cite this paper as: Deng Qili, Jirawan Deeprasert, (2025) The Sustainable Development Impact and Differentiation of ESG Practices in Chinese Real Estate Industry.. *Advances in Consumer Research*, 2 (5), 1949-1959

KEYWORDS

Environmental performance; Operating expense ratios; Sustainable development capabilities; ESG; Real estate industry; Cost efficiency; PLS-SEM; China; Sustainability strategy; Triple Bottom Line.

.

ABSTRACT

This study examines the impact of environmental performance (EP) on sustainable development capabilities (SDC) in China's real estate industry, with reducing operating expense ratios (RO) as a mediating variable. Drawing on the Triple Bottom Line framework and a sample of 675 respondents, the study employs Partial Least Squares Structural Equation Modeling (PLS-SEM) to analyze the proposed relationships. Results reveal that EP has both a direct positive effect on SDC and an indirect effect through RO, highlighting the financial-operational mechanism that connects environmental actions to long-term sustainability. The findings offer new theoretical insights into ESG impact pathways and underscore the practical value of integrating environmental strategies with cost-efficiency measures. This research contributes to a deeper understanding of how real estate firms can enhance their sustainability capabilities through targeted environmental initiatives and improved operational performance..

1. INTRODUCTION

In recent years, the real estate industry in China has faced mounting pressure to align its operations with the principles of sustainable development. As one of the most resource-intensive and environmentally impactful sectors, real estate development is closely scrutinized for its carbon emissions, energy consumption, and ecological footprint (Chen et al., 2024; Ren et al., 2024; Xu et al., 2024). In response to global climate imperatives and national sustainability strategies, enterprises are increasingly encouraged to adopt Environmental, Social, and Governance (ESG) practices (Ahmad et al., 2024). Among these, environmental performance (EP)—encompassing green building practices, renewable energy usage, and emissions reduction—has emerged as a particularly critical dimension for promoting long-term sustainability (Ahmed et al., 2024; Sun et al., 2024).

However, the pathway through which environmental performance translates into sustainable development capabilities is multifaceted and often indirect. Recent studies emphasize that the effectiveness of environmental strategies is contingent upon their ability to improve a firm's financial and operational efficiency (Adomako & Tran, 2022; Algarni et al., 2022; Gunarathne & Lee, 2021). In this context, reducing operating expense ratios (OER) becomes a vital mediating mechanism. Investments in energy-efficient technologies and sustainable construction not only lessen environmental harm but also lead to significant cost savings over time (Elaouzy & El Fadar, 2022; Vujanović et al., 2021). Lower operational expenses enable firms to reallocate resources toward innovation, community development, and strategic planning, thereby reinforcing their sustainability agenda (Mariani et al., 2022; Siddiqi et al., 2025)..

While previous literature has explored the broad impacts of ESG on organizational outcomes (S. Chen et al., 2023; Subramanian et al., 2024), there remains a lack of focused inquiry into the mediating role of cost efficiency in the ESG–sustainability nexus, particularly within China's real estate industry, where regional disparities and firm heterogeneity persist (Sun, 2024b; Tang, 2022). Furthermore, the direct effect of environmental performance on sustainable capabilities—beyond financial considerations—has not been clearly disentangled (Foulon & Marsat, 2023; Yan et al., 2021).

To address these gaps, this study proposes a simplified conceptual model that examines how environmental performance affects sustainable development capabilities, both directly and indirectly through reductions in operating expense ratios. By focusing on this narrowed pathway, the study seeks to provide empirical evidence on the financial-operational mechanisms linking environmental initiatives to broader sustainability outcomes. The findings contribute to theoretical refinement of ESG impact modeling and offer actionable insights for real estate firms aiming to enhance both environmental responsibility and long-term competitiveness.

2. LITERATURE REVIEW

2.1 Environmental Performance and Corporate Sustainability

Environmental performance (EP) has become a central construct in corporate sustainability research, particularly within resource-intensive industries such as real estate (Feng et al., 2024). EP encompasses a range of activities including energy efficiency, emissions reduction, sustainable resource use, and the adoption of green building technologies (Chen et al., 2024; Rahman & Islam, 2023). Prior studies suggest that enterprises with strong environmental performance are more likely to align with long-term environmental policy goals and enhance their market competitiveness through improved public perception and investor trust (Hao et al., 2023; Wang et al., 2023; Yan et al., 2021). In the context of Chinese real estate, where ecological concerns and regulatory pressure have intensified, environmental performance is not only a matter of compliance but also a strategic imperative for sustaining enterprise legitimacy and viability (Zeng et al., 2022). While EP has been empirically linked to firm resilience and innovation, the specific mechanisms through which it contributes to broader sustainability outcomes remain underexplored.

2.2 Operating Expense Ratios as a Mediating Mechanism

Operating expense ratio (OER), which reflects the proportion of operating costs relative to total revenue, serves as a key indicator of organizational efficiency (Lee, 2023). In real estate operations, cost drivers such as energy, maintenance, and facility management are substantial; thus, any improvement in EP can yield measurable reductions in operational expenditures (Mannino et al., 2021; Tannor et al., 2024). For instance, firms investing in energy-saving lighting, water-efficient systems, or smart building technologies have reported lower utility costs and improved resource utilization (Gupta et al., 2020). From a financial perspective, reduced operating expense ratios enhance a firm's flexibility to invest in long-term development goals, including sustainability initiatives (Chu et al., 2024; Khaled et al., 2021). Empirical studies in other industries have identified OER as a partial mediator between environmental strategies and firm performance (Chavez et al., 2021; Torrent-Sellens et al., 2023), but limited research has examined this mediating role in the context of China's real estate enterprises. This presents a notable research gap, especially as firms seek cost-effective pathways toward sustainability.

2.3 Linking Environmental Performance to Sustainable Development Capabilities

Sustainable development capabilities (SDC) refer to a firm's ability to generate long-term value by balancing economic performance, environmental responsibility, and social impact (de Almeida Barbosa Franco et al., 2024). In real estate, this includes not only constructing energy-efficient buildings but also fostering community engagement, ensuring project longevity, and complying with evolving regulatory standards (Chen et al., 2024). While environmental performance has been acknowledged as a driver of sustainability, some scholars argue that its impact is often indirect, mediated by operational or financial mechanisms (Akhtar et al., 2024; Aslam et al., 2021; Lapologang & Zhao, 2023). By improving cost efficiency through reduced OER, environmental performance can free up resources and enhance a firm's capacity to pursue sustainability strategies (Wu & Lin, 2022). Thus, examining both the direct and indirect effects of EP on SDC offers a more comprehensive understanding of how environmental investments translate into strategic outcomes.

Thus, it leads to the following hypotheses:

H1: Environmental Performance (EP) has a direct positive effect on Sustainable Development Capabilities.

H2: Environmental Performance (EP) has a negative effect on Reducing Operating Expense Ratios.

H3: Reducing Operating Expense Ratios has a positive effect on Sustainable Development Capabilities.

H4 (Mediation): Reducing Operating Expense Ratios mediates the relationship between Environmental Performance and Sustainable Development Capabilities.

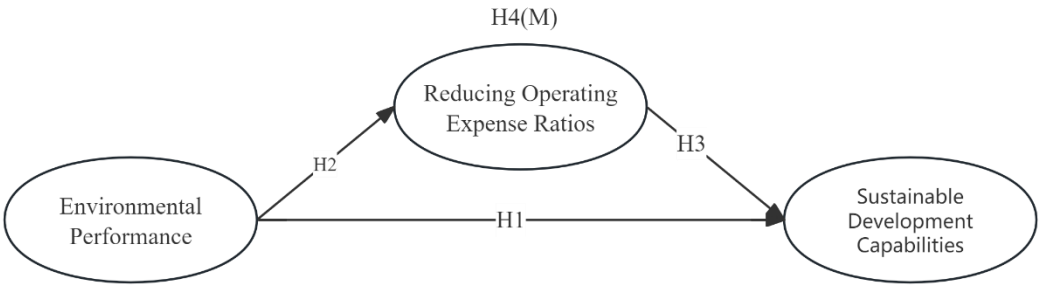

Figure 1 Framework of this study

3. RESEARCH METHOD

This study employed a quantitative research approach to examine how environmental performance (EP) influences sustainable development capabilities (SDC), both directly and indirectly through reducing operating expense ratios (OER), within Chinese real estate enterprises. A structured questionnaire was designed using established scales. EP was measured using five items adapted from L. Chen et al. (2023), OER was assessed with four items related to cost-saving efficiency (Yin et al., 2023), and SDC was measured with six items capturing long-term value creation and environmental resilience (Fallah Shayan et al., 2022).

Data were collected through an online survey, yielding 675 valid responses from ESG managers and executives across both private and state-owned real estate firms in China. The data were analyzed using Partial Least Squares Structural Equation Modeling (PLS-SEM) with SmartPLS 4.0. The analysis included confirmatory assessments of reliability and validity, followed by testing of direct and mediating relationships using bootstrapping (5,000 samples). The mediation effect of OER was specifically examined to understand the operational mechanism linking EP to SDC, with control variables such as firm size and ownership type included to address firm-level heterogeneity.

Results

Table 1 presents the demographic and professional characteristics of the 675 respondents. In terms of gender, the sample shows a relatively balanced distribution, with 329 males (48.7%) and 346 females (51.3%), ensuring representativeness across genders. Regarding age structure, the majority of respondents are in the age groups of 41–50 (30.1%) and 51 and above (39.1%), together accounting for nearly 70% of the sample, reflecting the experience-driven nature of management positions in Chinese listed companies. Younger respondents under 30 comprise only 4.6%, while those aged 30–40 represent 26.2%, indicating that management roles are predominantly occupied by mid- to late-career professionals.

Educational attainment is relatively high, with most respondents holding graduate (33.2%) or undergraduate degrees (32.1%), while 24.4% have junior college qualifications and 10.2% fall into the “other” category, suggesting that higher education is a common characteristic among corporate managers. Occupationally, the sample includes 350 senior managers (51.85%) and 325 middle managers (48.15%), demonstrating a balanced representation of managerial levels. With respect to work experience, a plurality of respondents (44.4%) have between 5–10 years of experience, followed by 29.2% with less than 5 years, 18.2% with 11–15 years, and 8.1% with more than 15 years, reflecting a workforce concentrated in the mid-career stage.

Geographically, the sample is distributed across 11 provinces and municipalities, with the largest representation from Shanghai (22.07%), followed by Zhejiang (14.37%), Guangdong (10.37%), and Beijing (12.15%). Other regions, such as Jiangsu (7.56%), Tianjin (7.11%), and Shandong (6.07%), also contribute notable proportions, while smaller shares come from Fujian (6.81%), Hainan (4.59%), Hebei (4.44%), and Liaoning (4.44%). This distribution illustrates a concentration of respondents in economically developed coastal regions, aligning with the regional clustering of real estate enterprises in China. Overall, the demographic and professional characteristics suggest that the sample is diverse yet appropriately representative of management groups within Chinese listed real estate enterprises.

Table 1 Sample Information

Information and options		**Frequency**	**Percentage**
Gender	Male	329	48.7

	Female	346	51.3
Age	under 30	31	4.6
	31-40	177	26.2
	41-50	203	30.1
	51 and above	264	39.1
Edu	Junior College Students	165	24.4
	Undergraduate	217	32.1
	Graduate	224	33.2
	Others	69	10.2
Job	Senior Manager	350	51.85
	Middle Manager	325	48.15
Years	Less than 5 years	197	29.2
	5-10 years	300	44.4
	11-15 years	123	18.2
	16 years and above	55	8.1
Province	Beijing	82	12.15
	Tianjin	48	7.11
	Hebei	30	4.44
	Liaoning	30	4.44
	Shanghai	149	22.07
	Jiangsu	51	7.56
	Zhejiang	97	14.37
	Fujian	46	6.81
	Shandong	41	6.07
	Guangdong	70	10.37
	Hainan	31	4.59

Table 2 summarizes the descriptive statistics of the observed variables, including means, standard deviations, skewness, and kurtosis for each measurement item. For Environmental Performance (EP), all seven items (EP1–EP7) showed mean values ranging from 3.50 to 3.74, indicating a moderately positive perception among respondents. The skewness values (e.g., -0.393 to -0.502) suggest a slight leftward skew, while kurtosis values indicate light-tailed distributions. For Reducing Operating Expense Ratios (RO1–RO4), the mean scores are relatively higher (3.63–3.74), with stronger left-skewed distributions (skewness between -0.796 and -0.942), suggesting respondents generally agreed that environmental measures contribute to cost reduction. The Sustainable Development Capabilities (SDC) items (SD1–SD4) also received moderately high ratings (means between 3.46 and 3.71), with negative skewness and slightly platykurtic distributions. Overall, all items fall within acceptable ranges for skewness (±2) and kurtosis (±7), supporting the normality assumption for further structural equation modeling (Masatlioglu et al., 2023).

Table 2 Descriptive Statistics Results

Variables	Items	N	Mean	S.D.	Skewness		Kurtosis	
					Value	S.E.	Value	S.E.
Environmental performance	EP1	675	3.579	1.201	-0.393	0.094	-0.831	0.188
	EP2	675	3.504	1.135	-0.253	0.094	-0.855	0.188
	EP3	675	3.593	1.246	-0.502	0.094	-0.770	0.188
	EP4	675	3.527	1.172	-0.302	0.094	-0.844	0.188
	EP5	675	3.646	1.196	-0.491	0.094	-0.772	0.188
	EP6	675	3.739	1.119	-0.492	0.094	-0.712	0.188
	EP7	675	3.572	1.296	-0.481	0.094	-0.930	0.188
Reducing operating expense ratios	RO1	675	3.742	1.002	-0.796	0.094	0.566	0.188
	RO2	675	3.630	1.229	-0.850	0.094	-0.097	0.188
	RO3	675	3.735	1.236	-0.942	0.094	-0.029	0.188
	RO4	675	3.639	1.188	-0.864	0.094	0.042	0.188
Sustainable development capabilities	SD1	675	3.710	1.249	-0.634	0.094	-0.662	0.188
	SD2	675	3.458	1.193	-0.336	0.094	-0.778	0.188
	SD3	675	3.627	1.171	-0.616	0.094	-0.492	0.188
	SD4	675	3.539	1.204	-0.397	0.094	-0.814	0.188

Table 3 presents the reliability analysis of the study's main constructs using Cronbach's alpha. All three variables exhibit high internal consistency, with Environmental Performance (7 items) showing a Cronbach's alpha of 0.915, indicating excellent reliability. Reducing Operating Expense Ratios (4 items) has an alpha of 0.862, and Sustainable Development Capabilities (4 items) reports 0.857—both well above the commonly accepted threshold of 0.70. These results confirm that the measurement scales used for all constructs are statistically reliable and suitable for further analysis (Cheung et al., 2024).

Table 3 Reliability Statistics

Study variables	Number of questions	Cronbach's alpha
Environmental Performance	7	0.915
Reducing operating expense ratios	4	0.862
Sustainable development capabilities	4	0.857

Table 4 reports the results of the Kaiser-Meyer-Olkin (KMO) measure and Bartlett's test of sphericity, both of which assess the suitability of the data for factor analysis. The KMO value of 0.937 indicates excellent sampling adequacy, suggesting that the data are highly appropriate for structure detection. Additionally, Bartlett's test of sphericity is significant (χ^2 = 18341.159, df = 861, $p < 0.001$), confirming that the correlation matrix is not an identity matrix and that there are sufficient inter-item correlations to justify factor analysis. Together, these results support the validity of proceeding with exploratory or confirmatory factor analysis (Masatlioglu et al., 2023).

Table 4 KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		0.937
Bartlett's Test of Sphericity	Approx. Chi-Square	18341.159
	df	861
	Sig.	0.000

Table 5 presents the results of the confirmatory factor analysis, including factor loadings, composite reliability (CR), and average variance extracted (AVE) for each latent variable. All factor loadings exceed the recommended threshold of 0.70, indicating strong item reliability. The composite reliability (CR) values for Environmental Performance (0.932), Reducing Operating Expense Ratios (0.906), and Sustainable Development Capabilities (0.903) are all above 0.90, demonstrating excellent internal consistency. Similarly, the AVE values for the three constructs—0.664, 0.708, and 0.700, respectively—exceed the 0.50 benchmark, confirming good convergent validity (Zhai & Aryadoust, 2024).

Table 5 Convergence Validity

Latent variables	Observed	Factor loading	CR	AVE
Environmental Performance	EP1	0.811	0.932	0.664
	EP2	0.778		
	EP3	0.861		
	EP4	0.830		
	EP5	0.774		
	EP6	0.851		
	EP7	0.793		
Reducing operating expense ratios	RO1	0.851	0.906	0.708
	RO2	0.844		
	RO3	0.827		
	RO4	0.843		
Sustainable development capabilities	SD1	0.827	0.903	0.700
	SD2	0.844		
	SD3	0.852		
	SD4	0.823		

Table 6 summarizes the structural model results, confirming all hypothesized relationships. Environmental Performance (EP) has a significant positive effect on Reducing Operating Expense Ratios (RO) ($\beta = 0.349$, $p < 0.001$), indicating that better environmental practices are associated with greater operational cost efficiency. EP also has a direct and significant effect on Sustainable Development Capabilities (SD) ($\beta = 0.127$, $p < 0.001$), suggesting that environmentally responsible actions contribute directly to an enterprise's long-term sustainability. Additionally, RO significantly predicts SD ($\beta = 0.201$, $p < 0.001$), confirming its mediating role. All T-values exceed 1.96 and p-values are below 0.001, providing strong support for the proposed model (Bliese & Wang, 2020).

Table 6 Structural Model Path Test

Path	β	S.E.	T	P	Results
EP -> RO	0.349	0.039	8.922	0.000	Supported
EP -> SD	0.127	0.036	3.489	0.000	Supported
RO -> SD	0.201	0.037	5.462	0.000	Supported

Table 7 presents the results of the mediation analysis, specifically examining the indirect effect of Environmental Performance (EP) on Sustainable Development Capabilities (SD) through Reducing Operating Expense Ratios (RO). The mediation effect is statistically significant, with an effect size of 0.070, standard error (SE) of 0.016, and t-value of 4.416 ($p < 0.001$). The bias-corrected 95% confidence interval ranges from 0.042 to 0.104, excluding zero, which further confirms the significance of the mediation. These results support the hypothesis that RO partially mediates the relationship between EP and SD, indicating that improved environmental practices enhance sustainability not only directly but also indirectly by improving operational cost efficiency (Gao et al., 2024).

Table 7 Mediation Effect Bootstrap Test

Mediation path	Effect size	SE	t	P	Bias-Corrected		
					2.5%	97.5%	Results
EP -> RO -> SD	0.070	0.016	4.416	0.000	0.042	0.104	Supported

4. DISCUSSION

This study aimed to investigate how environmental performance (EP) influences sustainable development capabilities (SDC) in China's real estate sector, with reducing operating expense ratios (RO) as a mediating mechanism. The empirical results provide robust support for the proposed model. First, EP was found to have a significant positive impact on SDC ($\beta = 0.127$, $p < 0.001$), suggesting that environmental initiatives—such as green construction, energy efficiency, and resource conservation—contribute directly to long-term sustainability. Second, EP also had a strong effect on RO ($\beta = 0.349$), indicating that environmentally responsible actions help enterprises improve cost efficiency. Third, RO significantly influenced SDC ($\beta = 0.201$), confirming that cost savings play a key role in enabling sustainability. Lastly, the mediating effect of RO between EP and SDC was supported (effect size = 0.070, $p < 0.001$), highlighting the operational pathway through which environmental performance fosters sustainability.

From a theoretical perspective, this study contributes to the ESG and sustainability literature by clarifying the mechanism through which environmental efforts affect firm-level sustainability outcomes. While previous research has often focused on the direct relationship between ESG and corporate performance (Nirino et al., 2021; Rahman et al., 2023), our model integrates cost efficiency (RO) as a mediating variable, offering a more nuanced understanding of the internal processes that link environmental initiatives to long-term capabilities. This mediation model enhances the explanatory power of the Triple Bottom Line framework by empirically validating how financial efficiency underpins the environmental-sustainability connection in an emerging market context.

Practically, the findings offer actionable insights for real estate firms seeking to balance profitability with sustainability. Investments in environmental performance not only fulfill regulatory and social expectations but also translate into tangible operational benefits, such as lower utility costs and more efficient resource use (Sun et al., 2024; Wiredu et al., 2024). These efficiencies, in turn, support broader sustainability goals, including resilience, stakeholder trust, and long-term value creation. For both private and state-owned enterprises, integrating environmental strategies into core operations can yield both economic returns and sustainable outcomes, reinforcing the case for proactive ESG adoption (Huang et al., 2025; Sun, 2024a).

Despite its contributions, this study has several limitations. First, the cross-sectional design limits causal inference; future studies could use longitudinal data to examine the temporal dynamics of the EP–RO–SDC relationship. Second, the focus on Chinese real estate firms may limit generalizability. Comparative studies across industries or countries could provide deeper insights into contextual factors that influence these relationships. Lastly, while the model includes operating expense efficiency as a mediator, other potential mechanisms—such as innovation, employee engagement, or stakeholder satisfaction—remain unexplored and warrant future investigation.

5. CONCLUSION

This study explored the impact of environmental performance (EP) on sustainable development capabilities (SDC) in the Chinese real estate industry, with a focus on the mediating role of reducing operating expense ratios (RO). By constructing and validating a simplified structural model using PLS-SEM, the research confirmed that environmental initiatives not only contribute directly to long-term sustainability but also indirectly enhance it through improved operational cost efficiency.

The findings reveal that EP has both direct and indirect positive effects on SDC, highlighting the dual pathways through which environmentally responsible practices support corporate sustainability. The mediating role of RO underscores the importance of internal efficiency as a bridge linking environmental strategies to sustainable outcomes. These results contribute to the ESG literature by offering empirical evidence of financial-operational mechanisms, especially in an emerging market context where cost sensitivity is high.

Practically, this study emphasizes that real estate firms seeking sustainability should not view environmental efforts merely as regulatory compliance or ethical responsibility, but also as a strategic investment that can generate economic and operational value. By reducing operating costs through energy efficiency, waste management, and green construction, firms can free up resources to support broader sustainability goals and enhance long-term competitiveness.

Future research could build upon this model by incorporating additional mediators (e.g., innovation capacity, stakeholder engagement), adopting longitudinal designs, or conducting cross-industry comparisons. Expanding the scope would help deepen the understanding of how environmental strategies evolve into sustainable capabilities across varying institutional and economic settings. This study reinforces the strategic value of environmental performance and cost efficiency in shaping a sustainable future for China's real estate sector

REFERENCES

[1] Adomako, S., & Tran, M. D. (2022). Sustainable environmental strategy, firm competitiveness, and financial performance: Evidence from the mining industry. Resources Policy, 75, 102515. https://doi.org/10.1016/j.resourpol.2021.102515

[2] Ahmad, H., Yaqub, M., & Lee, S. H. (2024). Environmental-, social-, and governance-related factors for business investment and sustainability: a scientometric review of global trends. Environment, Development and Sustainability, 26(2), 2965-2987. https://doi.org/10.1007/s10668-023-02921-x

[3] Ahmed, M., Khan, N., & Ayub, M. (2024). Green construction practices and economic performance: The mediating role of social performance and environmental performance. Integrated Environmental Assessment and Management, 20(5), 1396-1406. https://doi.org/10.1002/ieam.4894

[4] Akhtar, S., Li, C., Sohu, J. M., Rasool, Y., Hassan, M. I. U., & Bilal, M. (2024). Unlocking green innovation and environmental performance: the mediated moderation of green absorptive capacity and green innovation climate. Environmental Science and Pollution Research, 31(3), 4547-4562. https://doi.org/10.1007/s11356-023-31403-w

[5] Algarni, M. A., Ali, M., Albort-Morant, G., Leal-Rodríguez, A. L., Latan, H., Ali, I., & Ullah, S. (2022). Make green, live clean! Linking adaptive capability and environmental behavior with financial performance through corporate sustainability performance. Journal of Cleaner Production, 346, 131156. https://doi.org/10.1016/j.jclepro.2022.131156

[6] Aslam, S., Elmagrhi, M. H., Rehman, R. U., & Ntim, C. G. (2021). Environmental management practices and financial performance using data envelopment analysis in Japan: The mediating role of environmental performance. Business Strategy and the Environment, 30(4), 1655-1673. https://doi.org/10.1002/bse.2700

[7] Bliese, P. D., & Wang, M. (2020). Results provide information about cumulative probabilities of finding significance: Let's report this information. Journal of Management, 46(7), 1275-1288. https://doi.org/10.1177/0149206319886909

[8] Chavez, R., Malik, M., Ghaderi, H., & Yu, W. (2021). Environmental orientation, external environmental information exchange and environmental performance: Examining mediation and moderation effects. International Journal of Production Economics, 240, 108222. https://doi.org/10.1016/j.ijpe.2021.108222

[9] Chen, L., Gao, F., Guo, T., & Huang, X. (2023). Mixed ownership reform and the short-term debt for long-term investment of non-state-owned enterprises: Evidence from China. International Review of Financial Analysis, 90, 102861. https://doi.org/10.1016/j.irfa.2023.102861

[10] Chen, L., Hu, Y., Wang, R., Li, X., Chen, Z., Hua, J., Osman, A. I., Farghali, M., Huang, L., Li, J., Dong, L., Rooney, D. W., & Yap, P.-S. (2024). Green building practices to integrate renewable energy in the construction sector: a review. Environmental Chemistry Letters, 22(2), 751-784. https://doi.org/10.1007/s10311-023-01675-2

[11] Chen, S., Song, Y., & Gao, P. (2023). Environmental, social, and governance (ESG) performance and

financial outcomes: Analyzing the impact of ESG on financial performance. Journal of Environmental Management, 345, 118829. https://doi.org/10.1016/j.jenvman.2023.118829

[12] Cheung, G. W., Cooper-Thomas, H. D., Lau, R. S., & Wang, L. C. (2024). Reporting reliability, convergent and discriminant validity with structural equation modeling: A review and best-practice recommendations. Asia Pacific Journal of Management, 41(2), 745-783. https://doi.org/10.1007/s10490-023-09871-y

[13] Chu, B., Lin, B., Tian, L., Zheng, C., Ye, N., Zhu, Y., & Tan, Z. (2024). A long-term impact assessment of carbon capture (storage) investment conducted by conventional power company on sustainable development. Applied Energy, 358, 122567. https://doi.org/10.1016/j.apenergy.2023.122567

[14] de Almeida Barbosa Franco, J., Franco Junior, A., Battistelle, R. A. G., & Bezerra, B. S. (2024). Dynamic Capabilities: Unveiling Key Resources for Environmental Sustainability and Economic Sustainability, and Corporate Social Responsibility towards Sustainable Development Goals. Resources, 13(2), 22. https://doi.org/10.3390/resources13020022

[15] Elaouzy, Y., & El Fadar, A. (2022). Energy, economic and environmental benefits of integrating passive design strategies into buildings: A review. Renewable and Sustainable Energy Reviews, 167, 112828. https://doi.org/10.1016/j.rser.2022.112828

[16] Fallah Shayan, N., Mohabbati-Kalejahi, N., Alavi, S., & Zahed, M. A. (2022). Sustainable development goals (SDGs) as a framework for corporate social responsibility (CSR). Sustainability, 14(3), 1222. https://doi.org/10.3390/su14031222

[17] Feng, Y., Liu, W., Zhang, H., Li, Q., & Zhu, A. (2024). Synergistic assessment of environmental pollutants and carbon emissions in the Yellow River Basin, China: An integrated study based on scenario simulation and process decomposition. Ecological Indicators, 166, 112334. https://doi.org/10.1016/j.ecolind.2024.112334

[18] Foulon, B., & Marsat, S. (2023). Does environmental footprint influence the resilience of firms facing environmental penalties? Business Strategy and the Environment, 32(8), 6154-6168. https://doi.org/10.1002/bse.3478

[19] Gao, J., Hua, G., & Huo, B. (2024). Source reduction and innovation: Can sustainable finance assist in mitigating haze pollution? Journal of Cleaner Production, 449, 141772. https://doi.org/10.1016/j.jclepro.2024.141772

[20] Gunarathne, N., & Lee, K.-H. (2021). The link between corporate energy management and environmental strategy implementation: Efficiency, sufficiency and consistency strategy perspectives. Journal of Cleaner Production, 293, 126082. https://doi.org/10.1016/j.jclepro.2021.126082

[21] Gupta, A. D., Pandey, P., Feijóo, A., Yaseen, Z. M., & Bokde, N. D. (2020). Smart water technology for efficient water resource management: A review. Energies, 13(23), 6268. https://doi.org/10.3390/en13236268

[22] Hao, X., Wen, S., Li, K., Wu, J., Wu, H., & Hao, Y. (2023). Environmental governance, executive incentive, and enterprise performance: Evidence from Chinese mineral enterprises. Resources Policy, 85, 103858. https://doi.org/10.1016/j.resourpol.2023.103858

[23] Huang, S., Du, P., & Hong, Y. (2025). Can state-owned equity participation improve a company's environmental, social and governance performance? Evidence collected from China. Sustainability Accounting, Management and Policy Journal, 16(1), 226-258. https://doi.org/10.1108/SAMPJ-05-2023-0284

[24] Khaled, R., Ali, H., & Mohamed, E. K. A. (2021). The Sustainable Development Goals and corporate sustainability performance: Mapping, extent and determinants. Journal of Cleaner Production, 311, 127599. https://doi.org/10.1016/j.jclepro.2021.127599

[25] Lapologang, S., & Zhao, S. (2023). The impact of environmental policy mechanisms on green innovation performance: the roles of environmental disclosure and political ties. Technology in Society, 75, 102332. https://doi.org/10.1016/j.techsoc.2023.102332

[26] Lee, C.-C. (2023). Analyses of the operating performance of information service companies based on indicators of financial statements. Asia Pacific Management Review, 28(4), 410-419. https://doi.org/10.1016/j.apmrv.2023.01.002

[27] Mannino, A., Dejaco, M. C., & Re Cecconi, F. (2021). Building information modelling and internet of things integration for facility management—Literature review and future needs. Applied Sciences, 11(7), 3062. https://doi.org/10.3390/app11073062

[28] Mariani, L., Trivellato, B., Martini, M., & Marafioti, E. (2022). Achieving Sustainable Development Goals Through Collaborative Innovation: Evidence from Four European Initiatives. Journal of Business Ethics,

180(4), 1075-1095. https://doi.org/10.1007/s10551-022-05193-z

[29] Masatlioglu, Y., Orhun, Y., & Raymond, C. (2023). Intrinsic information preferences and skewness. American Economic Review, 113(10), 2615-2644. https://doi.org/10.1257/aer.20171474

[30] Nirino, N., Santoro, G., Miglietta, N., & Quaglia, R. (2021). Corporate controversies and company's financial performance: Exploring the moderating role of ESG practices. Technological Forecasting and Social Change, 162, 120341. https://doi.org/10.1016/j.techfore.2020.120341

[31] Rahman, H. U., Zahid, M., & Al-Faryan, M. A. S. (2023). ESG and firm performance: The rarely explored moderation of sustainability strategy and top management commitment. Journal of Cleaner Production, 404, 136859. https://doi.org/10.1016/j.jclepro.2023.136859

[32] Rahman, M. M., & Islam, M. E. (2023). The impact of green accounting on environmental performance: mediating effects of energy efficiency. Environmental Science and Pollution Research, 30(26), 69431-69452. https://doi.org/10.1007/s11356-023-27356-9

[33] Ren, T., Li, J., Yu, X., Marcone, M. R., & Maizza, A. (2024). Unveiling dilemmas and countermeasures in the green transformation of China's real estate industry through the lens of knowledge management. Journal of Knowledge Management, 28(9), 2548-2563. https://doi.org/10.1108/JKM-06-2023-0510

[34] Siddiqi, R. A., Codini, A. P., Ishaq, M. I., Jamali, D. R., & Raza, A. (2025). Sustainable supply chain, dynamic capabilities, eco-innovation, and environmental performance in an emerging economy. Business Strategy and the Environment, 34(1), 338-350. https://doi.org/10.1002/bse.3976

[35] Subramanian, B., Jain, N. K., & Bhattacharyya, S. S. (2024). Exploring the direct impact of environmental, social and governance (ESG) factors on organisational innovation output and institutional isomorphism: a study in the context of multinational life sciences organisations. Benchmarking: An International Journal, ahead-of-print(ahead-of-print). https://doi.org/10.1108/BIJ-05-2024-0391

[36] Sun, Y. (2024a). The impact of integrated reporting approach on sustainability performance of state-owned enterprises. Environment, Development and Sustainability. https://doi.org/10.1007/s10668-024-05633-y

[37] Sun, Y. (2024b). The real effect of innovation in environmental, social, and governance (ESG) disclosures on ESG performance: An integrated reporting perspective. Journal of Cleaner Production, 460, 142592. https://doi.org/10.1016/j.jclepro.2024.142592

[38] Sun, Y., Rahman, M. M., Xinyan, X., Siddik, A. B., & Islam, M. E. (2024). Unlocking environmental, social, and governance (ESG) performance through energy efficiency and green tax: SEM-ANN approach. Energy Strategy Reviews, 53, 101408. https://doi.org/10.1016/j.esr.2024.101408

[39] Tang, H. (2022). The effect of ESG performance on corporate innovation in China: The mediating role of financial constraints and agency cost. Sustainability, 14(7), 3769. https://doi.org/10.3390/su14073769

[40] Tannor, O., Attakora-Amaniampong, E., & Derbile, E. K. (2024). Drivers of facility management strategies used in multi-tenanted office buildings in Ghana. Journal of Facilities Management, 22(2), 256-274. https://doi.org/10.1108/JFM-12-2021-0156

[41] Torrent-Sellens, J., Ficapal-Cusí, P., & Enache-Zegheru, M. (2023). Boosting environmental management: The mediating role of Industry 4.0 between environmental assets and economic and social firm performance. Business Strategy and the Environment, 32(1), 753-768. https://doi.org/10.1002/bse.3173

[42] Vujanović, M., Wang, Q., Mohsen, M., Duić, N., & Yan, J. (2021). Recent progress in sustainable energy-efficient technologies and environmental impacts on energy systems. Applied Energy, 283, 116280. https://doi.org/10.1016/j.apenergy.2020.116280

[43] Wang, L., Shang, Y., & Li, C. (2023). How to improve the initiative and effectiveness of enterprises to implement environmental management system certification? Journal of Cleaner Production, 404, 137013. https://doi.org/10.1016/j.jclepro.2023.137013

[44] Wiredu, J., Yang, Q., Sampene, A. K., Gyamfi, B. A., & Asongu, S. A. (2024). The effect of green supply chain management practices on corporate environmental performance: Does supply chain competitive advantage matter? Business Strategy and the Environment, 33(3), 2578-2599. https://doi.org/10.1002/bse.3606

[45] Wu, R., & Lin, B. (2022). Environmental regulation and its influence on energy-environmental performance: Evidence on the Porter Hypothesis from China's iron and steel industry. Resources, Conservation and Recycling, 176, 105954. https://doi.org/10.1016/j.resconrec.2021.105954

[46] Xu, J., Qin, Y., Xiao, D., Li, R., & Zhang, H. (2024). The impact of industrial land mismatch on carbon emissions in resource-based cities under environmental regulatory constraints—evidence from China. Environmental Science and Pollution Research, 31(46), 56860-56872. https://doi.org/10.1007/s11356-023-

29458-w

[47] Yan, S., Almandoz, J., & Ferraro, F. (2021). The impact of logic (in) compatibility: Green investing, state policy, and corporate environmental performance. Administrative Science Quarterly, 66(4), 903-944. https://doi.org/10.1177/00018392211005756

[48] Yin, Z., Li, X., Si, D., & Li, X. (2023). China stock market liberalization and company ESG performance: The mediating effect of investor attention. Economic Analysis and Policy, 80, 1396-1414. https://doi.org/10.1016/j.eap.2023.10.022

[49] Zeng, H., Li, X., Zhou, Q., & Wang, L. (2022). Local government environmental regulatory pressures and corporate environmental strategies: Evidence from natural resource accountability audits in China. Business Strategy and the Environment, 31(7), 3060-3082. https://doi.org/10.1002/bse.3064

[50] Zhai, J., & Aryadoust, V. (2024). A meta-analysis of the reliability of a metacognitive awareness instrument in second language listening. Metacognition and Learning, 19(3), 879-906. https://doi.org/10.1007/s11409-024-09392-z