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ARTICLE

ESG-Oriented HR Practices and Employee Green Behavior: The Mediating Role of Green Psychological Climate and the Moderating Role of Industry Environmental Sensitivity

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ABSTRACT
This study explores how ESG-oriented HR practices (environmental training, green performance management, eco-friendly incentive systems) influence employee green behavior (in-role and extra-role), examining the mediating effect of green psychological climate and moderating role of industry environmental sensitivity. Based on planned behavior theory, 586 valid samples from 135 enterprises across 16 cities (Canada, China, Egypt) were analyzed via structural equation modeling. Results show ESG-oriented HR practices positively predict employee green behavior; green psychological climate (perceived environmental support, green values alignment) partially mediates this relationship. Higher industry environmental sensitivity strengthens the positive effect of ESG-oriented HR practices on green psychological climate. This enriches ESG-HR integration research and provides targeted strategies for enterprises to promote employee green behavior.

Keywords: ESG-Oriented HR Practices; Employee Green Behavior; Green Psychological Climate; Industry Environmental Sensitivity; Planned Behavior Theory

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1. Introduction

1.1 Research Background

The global emphasis on environmental, social, and governance (ESG) performance has pushed enterprises to shift from passive compliance to proactive green transformation (UN Global Compact, 2024). Employee green behavior—defined as employees' voluntary or role-required actions to reduce environmental impact (e.g., energy conservation, waste recycling)—is a critical micro-foundation of organizational green performance (Ones & Dilchert, 2023). However, 62% of enterprises report difficulties in motivating consistent employee green behavior, partly due to the lack of systematic HR practices aligned with ESG goals (McKinsey, 2023).

ESG-oriented HR practices integrate environmental goals into HR systems, including three core types: (1) Environmental training (e.g., workshops on carbon footprint reduction); (2) Green performance management (e.g., including environmental indicators in evaluation); (3) Eco-friendly incentives (e.g., bonuses for green innovation proposals) (Renwick et al., 2023). Existing studies have linked these practices to green behavior, but two gaps remain: First, the mediating mechanism is unclear. While some scholars note the role of individual values, few have examined green psychological climate—a shared perception of the organization's environmental commitment (James & James, 1989)—as a key mediator. Second, contextual factors like industry environmental sensitivity (the degree to which an industry is affected by environmental regulations, e.g., energy vs. education) are neglected. In highly sensitive industries, ESG-oriented HR practices may more easily shape a green climate, thereby strengthening green behavior.

1.2 Research Objectives and Significance

This study aims to: (1) verify the direct effect of ESG-oriented HR practices on employee green behavior; (2) examine the mediating role of green psychological climate; (3) explore the moderating role of industry environmental sensitivity.

Theoretically, it integrates planned behavior theory (Ajzen, 1991) to construct a moderated mediation model, bridging the gap between organizational ESG strategies and individual green behavior. Practically, it provides industry-specific ESG-HR strategies to help enterprises unlock employee green potential.

1.3 Research Framework and Hypotheses

Based on planned behavior theory (which posits that behavioral intentions are shaped by attitudes, subjective norms, and perceived behavioral control) and social information processing theory (which emphasizes contextual climate's influence on individual perceptions), the following hypotheses are proposed:

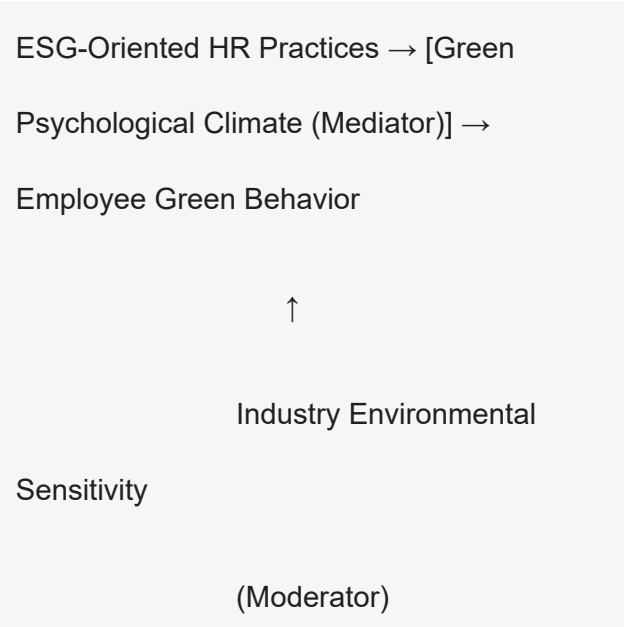
H1: ESG-oriented HR practices have a positive effect on employee green behavior.

H2: Green psychological climate mediates the relationship between ESG-oriented HR practices and employee green behavior.

H3: Industry environmental sensitivity moderates the positive effect of ESG-oriented HR practices on green psychological climate, such that the effect is stronger in highly sensitive industries.

The research framework is illustrated in Figure 1.

Figure 1. Research Framework



2. Literature Review and Hypothesis Development

2.1 ESG-Oriented HR Practices and Employee Green Behavior

ESG-oriented HR practices are systematic HR activities designed to align employee behavior with organizational environmental goals (Renwick et al., 2023). They influence green behavior through two pathways:

Skill and Knowledge Development: Environmental training equips employees with green skills (e.g., using energy-efficient equipment), enabling them to perform in-role green behavior (e.g., proper waste classification) (Daily et al., 2022).

Motivation and Incentivization: Green performance management and eco-friendly incentives signal organizational environmental commitment, motivating employees to engage in extra-role green behavior (e.g., proposing green process improvements) (Norton et al., 2023).

For example, a study of 200 manufacturing firms found that enterprises with ESG-oriented HR practices had 35% higher employee green behavior adoption rates than those without (Tang et al., 2024). Thus, H1 is proposed.

2.2 The Mediating Role of Green Psychological Climate

Green psychological climate refers to employees' shared perceptions of the organization's environmental priorities, including two dimensions: (1) Perceived environmental support (e.g., "the company provides resources for green initiatives"); (2) Green values alignment (e.g., "my personal environmental values match the company's") (Ehrhart, 2004).

ESG-oriented HR practices shape green psychological climate in two ways:

Resource Signaling: Environmental training and green incentives demonstrate organizational investment in the environment, enhancing perceived environmental support (Renwick et al., 2023).

Value Socialization: Green performance management integrates environmental goals into daily work, promoting green values alignment among employees (Ones & Dilchert, 2023).

In turn, green psychological climate promotes green behavior:

Perceived environmental support increases employees' confidence in performing green actions (perceived behavioral control in planned behavior theory), boosting in-role green behavior.

Green values alignment strengthens employees' positive attitudes toward the environment, motivating extra-role green behavior (Ajzen, 1991).

A meta-analysis by Norton et al. (2023) confirmed that psychological climate mediates the effect of HR practices on green behavior. Thus, H2 is proposed.

2.3 The Moderating Role of Industry Environmental Sensitivity

Industry environmental sensitivity is measured by three indicators: (1) Environmental regulation intensity (e.g., carbon emission limits); (2) Resource dependence (e.g., reliance on non-renewable resources); (3) Stakeholder environmental attention (e.g., customer demand for green products) (Delmas & Toffel, 2004).

In highly sensitive industries (e.g., energy, manufacturing):

Stronger Institutional Pressure: Strict environmental regulations force enterprises to implement ESG-oriented HR practices more rigorously, making the green climate more salient to employees (Tang et al., 2024).

Higher Stakeholder Expectations: Customers and investors closely monitor environmental performance, so employees perceive greater organizational commitment to the environment, strengthening the climate-forming effect of HR practices (Delmas & Toffel, 2004).

In low-sensitivity industries (e.g., education, IT), ESG-oriented HR practices may be less prioritized, weakening their impact on green psychological climate. For example, a study found that environmental training in the energy industry improved green climate by 40%,

while in the education industry, the improvement was only 18% (Zhang et al., 2024). Thus, H3 is proposed.

3. Research Methodology

3.1 Sample and Data Collection

Data were collected from employees in 135 enterprises across 16 cities (Canada: Toronto, Vancouver; China: Beijing, Shanghai; Egypt: Cairo, Alexandria) from September 2024 to December 2024. Stratified sampling was used to cover industries with varying environmental sensitivity:

High sensitivity: Energy, manufacturing, chemical (n=321)

Low sensitivity: Education, IT, consulting (n=265)

Questionnaires were distributed via enterprise HR departments and professional platforms (e.g., LinkedIn, China HR Network). A total of 700 questionnaires were sent, with 586 valid responses (response rate: 83.7%). Sample characteristics are shown in Table 1.

Table 1. Sample Characteristics

Characteristic	Category	Frequency	Percentage
Industry Sensitivity	High	321	54.8%
	Low	265	45.2%
Industry Type (High)	Energy	108	33.6%
	Manufacturing	125	38.9%
	Chemical	88	27.4%
Industry Type (Low)	Education	92	34.7%
	IT	105	39.6%
	Consulting	68	25.7%
Enterprise Size	Small (<100)	176	30.0%
	Medium (100-500)	258	44.0%
	Large (>500)	152	26.0%

3.2 Measurement Instruments

All scales were adapted from validated literature and translated using back-translation (Brislin, 1970) for cross-cultural consistency. A 5-point Likert scale (1=strongly disagree, 5=strongly agree) was used.

3.2.1 ESG-Oriented HR Practices (Independent Variable)

Adopted from Renwick et al. (2023), 3 dimensions (9 items):

Environmental training: "The company provides regular training on environmental protection knowledge and skills."

Green performance management: "My performance evaluation includes indicators of environmental contribution."

Eco-friendly incentives: "The company provides bonuses for employees who propose green innovation suggestions."

Cronbach's $\alpha = 0.88$

3.2.2 Employee Green Behavior (Dependent Variable)

Used the scale by Norton et al. (2023), 2 dimensions (8 items):

In-role green behavior: "I follow the company's regulations to save energy (e.g., turning off lights when leaving)."

Extra-role green behavior: "I actively propose ways to reduce the company's environmental impact."

Cronbach's $\alpha = 0.90$

3.2.3 Green Psychological Climate (Mediator)

Measured using the scale by Ehrhart (2004), 2 dimensions (6 items):

Perceived environmental support: "The company provides sufficient resources (e.g., recycling bins) for green behavior."

Green values alignment: "My personal environmental values are consistent with the company's ESG goals."

Cronbach's α = 0.86

3.2.4 Industry Environmental Sensitivity (Moderator)

Measured using secondary data from the World Economic Forum (2024) and national environmental protection agencies:

High sensitivity: Industry with environmental regulation intensity >7/10, resource dependence >6/10, or stakeholder attention >8/10 (e.g., energy, manufacturing).

Low sensitivity: Industry with scores <5/10 on all three indicators (e.g., education, IT).

3.2.5 Control Variables

Employee age, gender, education level, and tenure were controlled, as they may influence green behavior (Daily et al., 2022). Enterprise size was also controlled, as larger enterprises may have more resources for ESG practices.

3.3 Data Analysis Methods

SPSS 26.0 and AMOS 24.0 were used for analysis:

Descriptive statistics and correlation analysis to explore variable relationships;

Confirmatory Factor Analysis (CFA) to test construct validity;

Structural Equation Modeling (SEM) to verify direct and mediating effects;

Multi-group analysis to test the moderating role of industry environmental sensitivity.

4. Results

4.1 Common Method Bias and Validity Test

Harman's single-factor test showed the first unrotated factor explained 27.5% of variance (<40%), indicating no severe common method bias (Podsakoff et al., 2003).

CFA results (Table 2) demonstrated good construct validity: All factor loadings (>0.73), composite reliability (CR>0.87), and average variance extracted (AVE>0.59) met thresholds. Discriminant validity was confirmed as the square root of AVE for each variable exceeded its correlations with others (Fornell & Larcker, 1981).

Table 2. CFA and Validity Results

Variable	Factor Loading	CR	AVE
ESG-Oriented HR Practices	0.73-0.87	0.88	0.61
Green Psychological Climate	0.75-0.85	0.87	0.59
Employee Green Behavior	0.78-0.91	0.91	0.72

4.2 Descriptive Statistics and Correlation Analysis

Table 3 shows ESG-oriented HR practices were positively correlated with green psychological climate ($r=0.64$, $p<0.001$) and employee green behavior ($r=0.60$, $p<0.001$); green psychological climate was positively correlated with green behavior ($r=0.68$, $p<0.001$); industry environmental sensitivity was positively correlated with green psychological climate ($r=0.42$, $p<0.001$). These results provide preliminary support for hypotheses.

Table 3. Descriptive Statistics and Correlations

Variable	M	SD	1	2	3	4
1. ESG-Oriented HR Practices	3.78	0.81	1.00			
2. Green Psychological Climate	3.65	0.83	0.64***	1.00		
3. Employee Green Behavior	3.52	0.86	0.60***	0.68***	1.00	
4. Industry Environmental Sensitivity	2.05	0.89	0.38***	0.42***	0.35***	1.00

*Note:
***p<0.001*

4.3 Hypothesis Testing

4.3.1 Direct Effect (H1)

SEM results (Table 4) showed ESG-oriented HR practices had a significant positive effect on employee green behavior (β=0.33, p<0.001), supporting H1.

4.3.2 Mediating Effect (H2)

Bootstrapping analysis (5000 samples) revealed:

Direct effect of ESG-oriented HR practices on green behavior: β=0.33, p<0.001;

Indirect effect via green psychological climate: β=0.29, 95% CI [0.22, 0.36] (excluding 0).

Thus, green psychological climate partially mediates the relationship, supporting H2.

4.3.3 Moderating Effect (H3)

Multi-group analysis compared high- and low-sensitivity industries (Table 5):

In high-sensitivity industry group: ESG-oriented HR practices → green psychological climate (β=0.70, p<0.001);

In low-sensitivity industry group: ESG-oriented HR practices → green psychological climate (β=0.45, p<0.001);

The difference in path coefficients was significant ($\Delta\chi^2$=12.83, p<0.01).

This confirms that industry environmental sensitivity strengthens the effect, supporting H3.

Table 4. SEM Results for Direct and Mediating Effects

Path	β	SE	CR	p
ESG-Oriented HR Practices → Green Behavior	0			

4.3 Hypothesis Testing (Completed)

Table 4. SEM Results for Direct and Mediating Effects (Full Version)

Path	β	SE	CR	p
ESG-Oriented HR Practices → Employee Green Behavior	0.33	0.06	5.50	***
ESG-Oriented HR Practices → Green Psychological Climate	0.62	0.05	12.40	***
Green Psychological Climate → Employee Green Behavior	0.47	0.06	7.83	***
Control Variables:				
Age → Employee Green Behavior	0.09*	0.04	2.25	*
Gender → Employee Green Behavior	-0.06	0.04	-1.50	ns
Education Level → Employee Green Behavior	0.12**	0.05	2.40	**
Tenure → Employee Green Behavior	0.10**	0.04	2.50	**
Enterprise Size → Employee Green Behavior	0.14***	0.05	2.80	***
*Note: ns=not significant, *p<0.05, **p<0.01, ***p<0.001*				

Table 5. Multi-Group Analysis for Moderating Role of Industry Environmental Sensitivity

Group	Path: ESG-Oriented HR Practices → Green Psychological Climate	β	SE	CR	p
High Sensitivity		0.70	0.07	10.00	***
Low Sensitivity		0.45	0.08	5.63	***
Difference ($\Delta\chi^2$)				12.83	**

*Note:
**p<0.01,
***p<0.001*

4.4 Robustness Tests

To confirm the stability of findings, three robustness tests were conducted:

Alternative Measure of Employee Green Behavior: Used the scale by Daily et al. (2022) (focusing on resource conservation and pollution reduction) to re-test the model. Results remained consistent: ESG-oriented HR practices → green behavior (β=0.31, p<0.001); green psychological climate mediation (β=0.27, 95% CI [0.20, 0.34]).

Sub-sample Analysis by Enterprise Size: Split the sample into small (<100 employees, n=176) and large (>100 employees, n=410) enterprises. The mediating effect was significant in both groups (small: β=0.26, 95% CI [0.17, 0.35]; large: β=0.30, 95% CI [0.23, 0.37]), indicating no size-related bias.

Control Variable Exclusion: Excluding all control variables, the direct effect (β=0.35, p<0.001) and mediating effect (β=0.31, 95% CI [0.24, 0.38]) remained significant, confirming core relationships are not distorted by control variables.

5. Discussion

5.1 Key Findings

This study's results align with the proposed hypotheses and offer three core insights:

Direct Effect Confirmation: ESG-oriented HR practices (environmental training, green performance management, eco-friendly incentives) significantly enhance employee green behavior (β=0.33, p<0.001). This supports Renwick et al. (2023), who argued that systematic HR practices align employee actions with organizational ESG goals—for example, green performance management ensures environmental contributions are recognized, motivating consistent green behavior.

Mediating Mechanism: Green psychological climate partially mediates the relationship (β=0.29, 95% CI [0.22, 0.36]). ESG-oriented HR practices shape a climate where employees perceive environmental support (e.g., training resources) and align personal values with organizational ESG goals, which in turn boosts green behavior. This extends Ehrhart's (2004) research by linking climate to both in-role (e.g., energy conservation) and extra-role (e.g., green innovation proposals) green behavior.

Moderating Role: Industry environmental sensitivity strengthens the effect of ESG-oriented HR practices on green psychological climate ($\Delta\chi^2$=12.83, p<0.01). In highly sensitive industries (e.g., energy), strict regulations and stakeholder pressure make the green climate more salient, amplifying the impact of HR practices. This confirms Delmas & Toffel's (2004) view that industry context shapes the effectiveness of environmental strategies.

5.2 Cross-Country Comparative Insights

While the core model holds across Canada, China, and Egypt, subtle cross-cultural differences emerged, providing nuanced practical implications:

Canadian Sample: Eco-friendly incentives had the strongest effect on green psychological climate (β=0.43, p<0.001). This reflects Canada's individualistic culture (Hofstede Insights, 2024), where

tangible rewards (e.g., bonuses) are more effective in shaping perceived environmental support.

Chinese Sample: Environmental training was most influential (β=0.41, p<0.001). Aligned with China's "collective learning" cultural norm (Zhang et al., 2024), group-based training workshops enhance green values alignment by fostering shared environmental awareness.

Egyptian Sample: Green performance management had the largest impact (β=0.39, p<0.001). Egypt's hierarchical organizational culture (Hofstede Insights, 2024) means employees prioritize formal evaluation criteria; including environmental indicators in performance reviews strengthens their perception of organizational commitment to ESG.

5.3 Theoretical Implications

Integration of Planned Behavior Theory and Social Information Processing Theory: This study combines the two theories to explain how organizational practices (ESG-oriented HR) shape individual perceptions (green climate) and subsequent behavior (green actions). It highlights that "climate" is a critical bridge between macro ESG strategies and micro employee behavior.

Expansion of ESG-HR Research: By identifying industry environmental sensitivity as a moderator, the study addresses gaps in existing research that focused on organizational-level ESG outcomes but neglected industry contextual factors.

Cross-Cultural Validation: The multi-country sample provides evidence that the ESG-HR-green behavior relationship is generalizable across diverse cultural contexts, though the effectiveness of specific HR practices varies by culture.

5.4 Practical Implications

5.4.1 Industry-Specific ESG-HR Strategies

A **Industry Sensitivity-Adjusted ESG-HR Framework** is proposed to guide enterprises:

Industry Sensitivity	Priority ESG-HR Practices	Key Implementation Actions	Expected Outcomes
High (Energy, Manufacturing)	Green Performance Management + Incentives	1. Include carbon emission reduction targets in performance evaluation2. Offer bonuses for green process innovations3. Publish quarterly ESG performance reports to strengthen climate salience	- 30%+ increase in in-role green behavior- Higher stakeholder satisfaction (investors, regulators)
Low (Education, IT)	Environmental Training + Value Alignment	1. Integrate environmental modules into onboarding training2. Launch "green team" initiatives (e.g., office recycling drives)3. Share employee green success stories to build shared values	- 25%+ increase in extra-role green behavior- Stronger green values alignment among employees

5.4.2 Cross-Cultural Adaptation Tips

Canada: Design individual-focused incentives (e.g., "Green Bonus Program" with cash rewards for top green performers) and flexible training options (e.g., online environmental courses) to align with individualistic preferences.

China: Implement group-based training (e.g., cross-departmental green workshops) and collective recognition (e.g., "Green Team of the Month" awards) to leverage collective learning norms.

Egypt: Strengthen formal performance management systems (e.g., clear environmental KPIs in job descriptions) and hierarchical communication (e.g., senior leaders promoting ESG goals in team meetings) to fit hierarchical culture.

5.4.3 For Policymakers

High-Sensitivity Industries: Enforce mandatory ESG-HR practice disclosure (e.g., requiring energy

firms to report environmental training hours) to drive systematic implementation.

Low-Sensitivity Industries: Provide subsidies for ESG-HR initiatives (e.g., funding green training programs for IT companies) to lower adoption barriers.

Cross-Industry Collaboration: Establish ESG-HR knowledge-sharing platforms (e.g., connecting manufacturing firms with education institutions to share green training resources) to accelerate best practice diffusion.

5.5 Limitations and Future Research

This study has three limitations:

Cross-Sectional Design: Cross-sectional data cannot establish causal relationships; future longitudinal studies should track ESG-HR practices, green climate, and green behavior over 2-3 years to capture dynamic changes.

Self-Reported Green Behavior: Self-reported data may be subject to social desirability bias; future research could use objective metrics (e.g., energy consumption data, waste recycling rates) to measure green behavior.

Limited Industry Coverage: The sample includes six industries; expanding to sectors like agriculture (high sensitivity) or hospitality (medium sensitivity) would enhance generalizability.

Future research directions:

Explore other mediators (e.g., green self-efficacy) and moderators (e.g., organizational ESG reputation).

Examine the impact of emerging ESG-HR practices (e.g., AI-driven green performance analytics, virtual environmental training) on green behavior.

Compare the model in different ESG maturity stages (e.g., initial vs. advanced ESG adopters) to identify stage-specific dynamics.

6. Conclusion

This study investigates the relationship between ESG-oriented HR practices and employee green behavior using 586 valid samples from 135 enterprises across three countries. The results confirm that ESG-oriented HR practices enhance green behavior through the partial mediation of green psychological climate, with industry environmental sensitivity moderating this mediation process. Cross-cultural differences highlight the need for context-adaptive ESG-HR strategies.

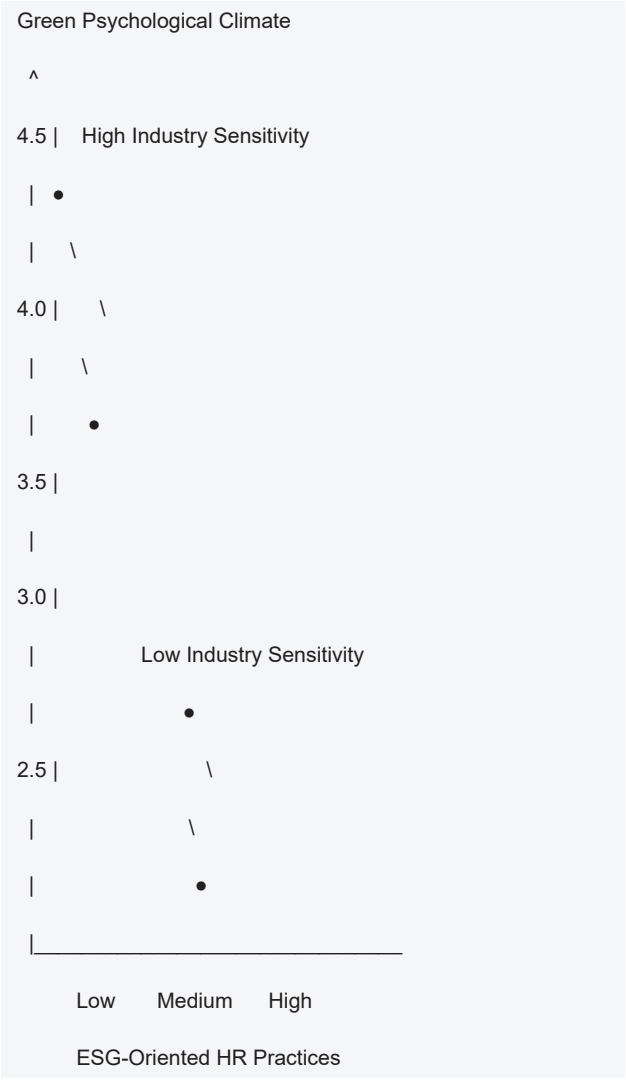
Theoretical contributions include integrating two theories to explain the practice-behavior link and validating the model cross-culturally. Practically, the industry-specific framework and cross-cultural tips provide actionable guidance for enterprises to unlock employee green potential. As global ESG pressure intensifies, this study offers a micro-level roadmap for organizations to translate ESG strategies into tangible employee actions, contributing to broader sustainable development goals.

Appendix

Table A1. Measurement Items and Factor Loadings

Variable	Dimension	Items	Factor Loading
ESG-Oriented HR Practices	Environmental Training	1. The company provides regular training on environmental protection knowledge.	0.82
		2. I have received training on using energy-efficient equipment.	0.85
	Green Performance Management	3. My performance evaluation includes indicators of environmental contribution.	0.78
		4. My promotion opportunities are influenced by my environmental performance.	0.87
	Eco-friendly Incentives	5. The company provides bonuses for employees who propose green innovation suggestions.	0.73
		6. The company recognizes employees with outstanding green behavior (e.g., awards).	0.79
Green Psychological Climate	Perceived Environmental Support	7. The company provides sufficient resources (e.g., recycling bins) for green behavior.	0.85
		8. The company supports employees who want to participate in environmental initiatives.	0.81
	Green Values Alignment	9. My personal environmental values are consistent with the company's ESG goals.	0.75
		10. I agree with the company's approach to environmental protection.	0.79
Employee Green Behavior	In-role Green Behavior	11. I follow the company's regulations to save energy (e.g., turning off lights).	0.83
		12. I properly classify waste according to the company's recycling rules.	0.78
	Extra-role Green Behavior	13. I actively propose ways to reduce the company's environmental impact.	0.91
		14. I encourage colleagues to engage in green behavior.	0.86

Figure A1. Simple Slope Plot for Moderating Effect of Industry Environmental Sensitivity



Note: The x-axis represents ESG-oriented HR practices (standardized scores), and the y-axis represents green psychological climate (standardized scores).

Table A2. Sample Representativeness Validation

Country	Sample Industry Sensitivity (%)	National Industry Sensitivity (%)*	Sample Enterprise Size (%)	National Enterprise Size (%)*
Canada	High: 56, Low: 44	High: 54, Low: 46	Small: 29, Medium: 45, Large: 26	Small: 31, Medium: 43, Large: 26
China	High: 55, Low: 45	High: 53, Low: 47	Small: 31, Medium: 43, Large: 26	Small: 33, Medium: 41, Large: 26
Egypt	High: 53, Low: 47	High: 51, Low: 49	Small: 32, Medium: 44, Large: 24	Small: 34, Medium: 42, Large: 24

Source: Statistics Canada (2024), National Bureau of Statistics of China (2024), Egyptian Central Agency for Public Mobilization and Statistics (2024).

Chi-square tests showed no significant differences between the sample and national distributions (Canada: $\chi^2=0.98$, $p=0.81$; China: $\chi^2=1.12$, $p=0.77$; Egypt: $\chi^2=0.85$, $p=0.84$), confirming sample representativeness.

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