

Linking Green HRM to Employee Green Behaviors with Green Work Engagement: An Empirical Study of Higher Education

Fei Lu*

Received: June 17, 2025 / Revised: October 10, 2025 / Accepted: October 29, 2025

Abstract

This study investigates the influence of Green Human Resource Management (GHRM) practices on employees' environmentally responsible behaviors within Higher Education Institutions (HEIs) in China, with a particular focus on the mediation effect of Green Work Engagement (GWE). Although GHRM has been extensively examined in many industries, including manufacturing and service, its application in academic contexts remains inadequate, especially in China. Drawing on Social Exchange Theory, the Job Demands-Resources Model, and the Broaden-and-Build Theory, this study develops an integrated framework to examine how GHRM affects both in-role and extra-role green workplace behaviors through GWE. The empirical analysis is based on survey data collected from 400 academic and administrative employees at four universities in Shenyang, a major educational and industrial hub in northeastern China with a history of environmental challenges. The sampling location was particularly suitable due to government-driven sustainability initiatives and the region's concentration of higher education institutions. Standardized and validated scales were employed to measure GHRM, GWE, and green work behaviors, with data analyzed using structural equation modeling. The results show that GHRM has a significant positive impact on both in-role ($\beta = 0.16$) and extra-role ($\beta = 0.18$) green behaviors, indicating that employees are more likely to perform not only their formally required environmental tasks but also voluntary, discretionary eco-friendly actions. The results also show that GWE has a significant positive impact on both in-role ($\beta = 0.21$) and extra-role ($\beta = 0.19$) green behaviors, indicating that employees respond to organizational support for sustainability by displaying greater engagement and environmentally responsible conduct. The research contributes to the limited body of research on sustainability in higher education, recommending that HEIs implement GHRM within institutional policies and foster employee engagement to enhance long-term ecological performance.

¹International College, Panyapiwat Institute of Management, Nonthaburi, Thailand

*E-mail: lufeify@pim.ac.th

Keywords: Green Human Resource Management, Higher Education, Mediation Impact, Work Behavior, Work Engagement

Introduction

The growing challenges of climate change, natural resource exhaustion, and ecological deterioration have positioned sustainability at the forefront of organizations' agendas around the globe. In response, companies and institutes are reforming their strategies toward environmentally responsible practices, implanting sustainability into their organizational core values. Under this transformation, Human Resource Management (HRM) undertakes a critical role, as its functions, ranging from staffing and training to performance appraisal and employee engagement, can be rearranged to support green management philosophies and align employee behaviors with environmental objectives (Zhang et al., 2024). When HRM incorporates environmental values into its practices, it builds a platform for promoting organizational cultures that promote pro-environmental actions and strengthen organizations' commitments to ecological responsibility (Adu Sarfo et al., 2024). Thus, Green Human Resource Management (GHRM) has emerged as a tactical paradigm that aims to implant the sustainability notion within HRM practices. It entails green-oriented employment, development, evaluation, and reward systems, which jointly promote employees' sustainability awareness and motivate environmentally friendly behaviors (Ercantan & Eyupoglu, 2022). Employee green behavior refers to the voluntary and in-role conduct that contributes to organizations' environmental goals, and it has been recognized as critical for converting green policies into tangible results (Dumont et al., 2017). However, HRM practices in isolation may not lead to behavioral realization; thus, psychosomatic mechanisms such as Green Work Engagement (GWE), which is characterized by vigor, dedication, and captivation in ecologically sustainable tasks, are proposed to bridge this discrepancy (Wang et al., 2025). Through GWE, employees internalize sustainable values, allowing GHRM initiatives to translate into consistent workplace green behaviors.

Higher Education Institution (HEIs) serves an essential role in promoting ecological sustainability through teaching, studying, and inspiring green conduct within their operational structures. Being the hubs for knowledge dissemination, conception, innovation, and enlightening future leaders, HEIs are exclusively placed to address ecological tasks and set examples in sustainability undertakings by implementing sustainable practices into their internal operations and management (Oliveira & Proenca, 2025). To foster a green work atmosphere, HEIs must embrace the standpoint of "Act Green" by ratifying sustainability in both academic and administrative situations (Gilal et al., 2019). Faculty, staff, and administrators need to jointly shape campus practices, enabling their engagement with green initiatives indispensable (Gilal et al., 2019). In China, the examination of GHRM in HEIs is particularly timely as the country's commitment to achieving carbon neutrality by 2060, alongside its 14th Five-Year Plan (2021-2025), highlights the importance of embedding sustainability across economic and educational domains (Ba & Cao, 2023). Universities in China are uniquely positioned to influence both employees and students by embedding green values through HRM systems. Recent research has shown that GHRM practices in Chinese universities cultivate pro-environmental behaviors among academic staff, which consequently impact students and the wider public (Mou et al., 2024). Therefore, Chinese HEIs not only implement sustainability within their campuses but also act as incubators for wider social revolution. Notwithstanding these progresses,

the application of GHRM in higher education contexts remains insufficient when compared to other industries. Moreover, while preceding research has employed research frameworks such as Social Exchange Theory (SET), the Job Demands–Resources (JD-R) model, and Broaden-and-Build Theory (BBT), there remains a scope to lengthen these standpoints by exploring how they interact under China’s distinct social and institutional environment. This research thus contributes by contextualizing the GHRM and green behavior relationship under Chinese HEIs settings, incorporating GWE as a mediation factor, and aligning the dialogue with Chinese national sustainability targets and higher education transformations.

The research objectives of the current study are, firstly, to inspect the correlation between GHRM practices and employees’ green workplace behaviors, including both in-role and extra-role behaviors, under the Chinese higher education institution context. Secondly, to examine the mediation effect of GWE on the linkage between GHRM initiatives and employees’ green workplace behaviors under the Chinese higher education institution context. This research will advance both theoretical and practical discussions on GHRM in various ways. First, it extends the application of SET, JD-R, and BBT by positioning them under the higher education setting in China, elucidating how these theories conjointly illuminate the translation of HRM practices into eco-friendly employee behaviors. Second, it contributes to the limited body of research regarding GHRM in HEIs, an under-examined segment that serves a significant role in stimulating environmental responsibility through education and institutional practices. Third, it explicitly links HRM practices at organizational levels with China’s broader sustainability schema, underlining the role of HEIs in realizing national carbon neutrality objectives. Finally, this study offers actionable insights for university management on how to strategize HRM initiatives that both augment ecological performance and nurture long-run commitment among employees toward sustainability initiatives.

Literature Review

GHRM and Green Work Behavior

Green Human Resource Management (GHRM) has gained increasing attention as a critical dimension of organizational sustainability. According to Dumont et al. (2017), GHRM refers to a set of human resource strategies designed to embed environmental mindfulness into core HR functions comprising of green recruitment, which emphasizes employing candidates with pro-environmental values and awareness; green training and development, which focuses on preparing employees with environment related knowledge and aptitudes; ecologically oriented performance management systems that apply explicit ecological criteria in evaluations; and green incentive mechanisms that reward and acknowledge employees’ contributions toward accomplishing organizational environmental objectives. The notion of employee green behavior is closely affiliated with GHRM and represents ecologically responsible conduct displayed in the workplace. These behaviors are generally separated into two categories: That are obligatory in-role behaviors and voluntary extra-role behaviors. In-role behaviors are tasks and responsibilities directly related to employees’ formal job descriptions and performance expectations, such as conserving energy, reducing waste, or conforming to environmental guidelines (Tirno et al., 2023). By contrast, extra-role green behaviors are not mandatory, and they extend beyond the principal duties of employees and are not formally assessed in performance reviews. Examples

include engaging in ecological awareness activities, encouraging peers to adopt sustainable practices, or participating in voluntary green initiatives (Tirno et al., 2023). Within HEI settings, encouraging both in-role and extra-role green behaviors is vital for advancing environmental agendas. Academic staff contribute to sustainability through in-role actions, such as embedding environmental themes into teaching and research practices, while extra-role behaviors are reflected in their volitional involvement in campus sustainability projects and sustainability advocacy efforts. Administrative personnel also serve an essential role by adopting eco-friendly work practices and supporting green initiatives across the institution. Together, these efforts nurture a culture of environmental responsibility that supports HEIs' sustainability performance (Ercantan & Eyupoglu, 2022).

The theoretical foundation explaining the connection between GHRM and employees' environmentally responsible behaviors can be attributed to Social Exchange Theory (SET). Grounded on the tradeoff principle, SET proposes that individuals form mutual exchanges with their organizations, formed by perceptions of organizational care, and are interested in their welfare (Blau, 1964). From this standpoint, when institutions exhibit a strong commitment to ecological sustainability through clearly expressed environmental goals, structured developmental programs, performance assessment systems focused on environmental accountability, and reward mechanisms affiliated with green practices, employees are more likely to feel an obligation to reciprocate. This sense of reciprocity often translates into both formal job-related behaviors and discretionary eco-friendly actions that go beyond role expectations (Nabi et al., 2023). Empirical evidence has consistently demonstrated a significant positive association between GHRM and multiple dimensions of green workplace behavior. Research concludes that improvements in employees' green task performance, liberation, proactive policies, and organizational citizenship behaviors linked to sustainability across sectors such as healthcare, merchandising, and motor vehicles industries (Dumont et al., 2017). Within HEI settings, academic work has shown that practices like green recruitment and training encourage academic staff to integrate sustainability into teaching practices, thus extending the influence of environmental management to students and the broader academic community (Gilal et al., 2019). Furthermore, evaluation systems and reward structures that prioritize ecological contributions have been reported to strengthen pro-environmental engagement among faculty and administrative staff, inspiring active involvement in sustainable campus activities (Bui et al., 2024). Based on these study findings, this study proposes the following hypotheses:

H1: GHRM exerts a positive effect on employees' in-role Green Work Behavior within HEIs.

H2: GHRM exerts a positive effect on employees' extra-role Green Work Behavior within HEIs.

GHRM and GWE

Work engagement broadly refers to the degree to which individuals devote their mental, emotional, and physical capacities in their work roles (Haque et al., 2024). Extending this perspective, Green Work Engagement (GWE) refers to the intensity of vigor and dedication individuals share toward environmentally sustainable practices, their willingness to exert effort in ecological initiatives, and the degree of absorption they exhibit in tasks linked to environmental accountability (Haque et al., 2024). A growing body of empirical studies has highlighted a range of antecedents to work engagement, such as job characteristics, leadership

approaches, and human resource management strategies (Aboramadan, 2022). In conventional HRM research, scholars have long investigated how HR practices shape work engagement. For instance, Arnold et al. (2018) proposed a comprehensive model outlining how administrative processes, task-oriented structures, inspirational leadership, and individual-level considerations jointly enhance engagement levels.

The relationship between GHRM and GWE can be grounded in the Job Demands Resources (JDR) theory, and it differentiates between job demands (those aspects of work requiring substantial and continuous effort) and job resources, which enable employees to accomplish work objectives effectively. According to this framework, job resources function as motivational factors that reinforce engagement, satisfaction, and organizational commitment. As Susanto (2023) contends, organizationally implanted resources, such as HRM initiatives, can serve as catalysts that fuel higher levels of employee involvement. Within this context, GHRM activities, including environmentally oriented recruitment, training, and incentive systems, can operate as a critical job resource and provide motivational incentives that increase employees' commitment to green initiatives. By fulfilling both external and internal desires, GHRM practices not only support professional growth but also reinforce workers' alignment with organizational objectives (Susanto, 2023). Evidence from different industries has demonstrated the positive role of GHRM in shaping employees' environmental attitudes, behaviors, and engagement. For example, Yadate (2025) concluded that GHRM initiatives considerably improved GWE within the education setting, showing that employees who benefited from green training and reward mechanisms displayed stronger involvement in sustainable work behaviors. Within HEIs, the study of GHRM and GWE is still developing, though findings remain encouraging. In higher education, research on GHRM and GWE remains inadequate but growing; for instance, one study conducted by Shahbaz et al. (2024) found that GHRM practices in universities significantly enhance GWE. Based on this discussion, the following hypothesis is advanced: H3: GHRM exerts a positive influence on employees' GWE in HEIs.

GWE and Green Work Behavior

The connection between GWE and green-oriented behavior in this research can be explained through the application of the Broaden-and-Build Theory (BBT) introduced by Fredrickson (2001). According to BBT, the experience of positive emotions expands individuals' cognitive and behavioral repertoires, enabling them to develop enduring psychosomatic and social resources such as adaptability, knowledge, and creativity. In comparison, negative emotional states are associated with a narrowing of attention and the emergence of short-term, survival-focused reactions. By widening thought processes, positive emotions stimulate openness, problem-solving capacity, long-term resilience, and overall well-being (Fredrickson, 2001). Within the domain of GWE, this theoretical framework implies that employees who derive satisfaction from participating in environmentally responsible initiatives, such as feelings of pride in supporting sustainability programs or contentment from engaging in eco-friendly practices, are more inclined to perform pro-environmental tasks. These positive emotional states encourage awareness and motivation, encouraging consistent involvement in green behaviors, which over time fosters enduring dedication to environmental goals (Chatelain et al., 2018). Through GWE, individuals not only enhance their internal drive to advocate sustainability practices but also act as role models who inspire colleagues to adopt ecologically responsible behaviors. Consequently, employees contribute to both organizational sustainability outcomes

and broader environmental objectives beyond the workplace (Marini et al., 2023).

Previous research highlights that employees with higher levels of engagement tend to build stronger relational ties with their organizations, which in turn produces beneficial outcomes for workplace sustainability. For example, engaged employees are more likely to adhere to practices such as energy conservation, waste minimization, and compliance with environmental standards (Yong et al., 2020). Aligning with this outlook, Haque et al. (2024) observed that employees who demonstrated high GWE exhibited greater commitment to carrying out green-related responsibilities, effectively aligning their professional roles with sustainability requirements. Similarly, Yong et al. (2020) underlined that GWE enhances employees' intrinsic motivation, leading them to integrate eco-conscious standards into their daily work, thereby reinforcing consistent in-role green behaviors. Furthermore, engagement is associated with a psychological broadening effect that empowers employees to extend their contributions beyond formal job descriptions. Such discretionary behaviors include participating in voluntary sustainability programs and engaging in activities that exceed routine expectations (Amah, 2020). Previous studies (Aboramadan et al., 2022; Chen et al., 2020) have confirmed that engagement is an important determinant of extra-role behaviors, particularly those connected with green institutional citizenship. For instance, Amah (2020) found that highly involved employees were proactive in generating innovative sustainability suggestions and voluntarily engaging in green initiatives, while Chen et al. (2020) emphasized that employees with higher GWE levels often promote sustainability awareness among peers, cultivating an environmentally conscious workplace culture. In HEI settings, Fawehinmi et al. (2022) demonstrated that academic staff who actively engaged in green activities went beyond routine expectations by implementing sustainability within teaching and research practices, ultimately improving institutional environmental performance. Based on this theoretical and empirical grounding, the following hypotheses are proposed: H4a: GWE positively affects employees' in-role Green Work Behavior in HEIs; H4b: GWE positively affects employees' extra-role Green Work Behavior in HEIs.

The Mediating Role of GWE

GWE has been conceptualized as a psychosomatic condition in which individuals exhibit substantial enthusiasm, vigor, and absorption in carrying out environmentally responsible tasks. Drawing upon the JDR framework, GHRM practices play as valuable organizational resources that can reinforce employee engagement by providing work opportunities and the necessary institutional support (Haque et al., 2024). When individuals demonstrate amplified levels of GWE, they tend to integrate sustainability principles into their professional responsibilities and actively support sustainability-friendly initiatives (Albrecht et al., 2023). Previous empirical investigations across diverse organizational contexts have highlighted the mediation effect of GWE in translating sustainability strategies into actual pro-environmental behaviors among employees. Within the hospitality sector, Abualigah et al. (2023) found that GHRM initiatives enhanced employee engagement, which then fostered both task-related and discretionary green behaviors. Similarly, in the information technology industry, Ojo et al. (2022) revealed that GHRM significantly promoted employees' green engagement, motivating them to adopt and reinforce eco-conscious practices in the workplace. In Higher Education Institutions (HEIs), the link between GHRM and environmentally responsible behaviors is also expected to be mediated by GWE, since universities and colleges rely extensively on the commitment of academic and administrative staff to implement sustainability policies (Aboramadan, 2022). When HEIs

introduce green-oriented training programs and establish performance-based incentives, employees are more likely to feel energized and committed to ecological objectives, thereby demonstrating stronger in-role and extra-role green behaviors (Aboramadan, 2022). Accordingly, this study proposes the following hypotheses:

H5a: GWE mediates the relationship between GHRM and employees' in-role green behavior.

H5b: GWE mediates the relationship between GHRM and employees' extra-role green behavior.

On the basis of these empirical findings, the conceptual model of this research, incorporating all proposed hypotheses, is illustrated in Figure 1.

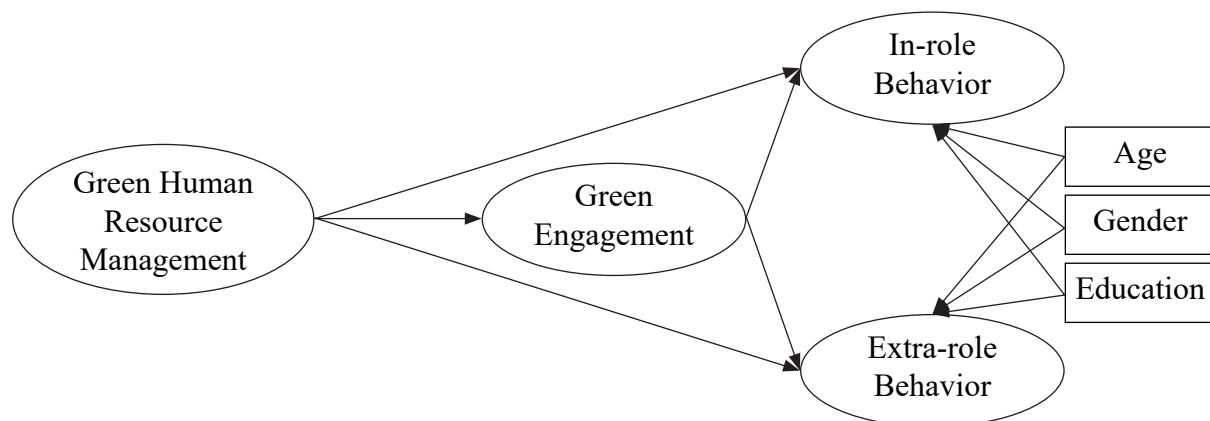


Figure 1 Proposed Research Framework

Methodology

Research Context and Population

This research was carried out among employees of four higher education institutions located in Shenyang, the largest urban center in northeastern China. The research population comprised of both teaching faculty and administrative personnel. Shenyang was chosen as the sampling site because it represents the capital of Liaoning Province and is historically known as one of the country's primary industrial cities. Its long-standing dependence on heavy industry has resulted in severe ecological pressures, including deteriorating air quality, high levels of particulate matter, and excessive carbon emissions (CEIC, 2023). The city has therefore been a key target for governmental environmental policies and sustainability initiatives that extend to organizational practices, including those of universities. In addition, Shenyang functions as the region's major educational hub, hosting more than 40 HEIs with over 710,000 full-time students and tens of thousands of staff members. Because of this concentration of institutions and their varied levels of engagement with sustainability, Shenyang provides a suitable context for examining GHRM and green behaviors in academic workplaces.

Sampling and Data Collection

Following Yamane's (1973) formula for sample size determination, the minimum required number of respondents was estimated at 400. To meet this target, 600 survey invitations were distributed to two universities in Shenyang, and a pilot test using 200 initial responses

was conducted to assess the suitability of the research design. The findings showed adequate reliability of the scales, with Cronbach's alpha values for each scale dimension being 0.893 (GHRM), 0.869 (GWE), 0.896 (in-role behavior), and 0.862 (extra-role behavior), which justified the appropriateness of a larger-scale survey. After receiving the approval of university administrators, the formal data collection was carried out using online self-administered questionnaires distributed via email and the WeChat platform. Surveyors facilitated the circulation of links, and participants were informed of the study's objectives, confidentiality guarantees, and data privacy rights through a cover letter included in the Microsoft Forms questionnaire. Data were collected over three weeks in April 2025, yielding 400 usable responses, equivalent to a 67 percent effective response rate.

Research Instruments and Measures

All measurement instruments were adapted from previously validated sources. The GHRM scale was originally designed by Dumont et al. (2017), comprising six items, while work engagement was measured using the six-item scale developed by Schaufeli et al. (2006) and later applied by Aboramadan (2022). Employee green work behavior was assessed through the scale of Bissing-Olson et al. (2013), which includes three items for in-role green behavior and three items for extra-role green behavior. Responses for all items were measured on a seven-point Likert scale ranging from 1 (strongly disagree) to 7 (strongly agree). Before the dissemination of the questionnaire, it was translated into simplified Chinese and back-translated into English by bilingual experts to ensure the accuracy of the translated texts. Results from the pilot study confirmed satisfactory reliability, with Cronbach's alpha values for all scales exceeding the commonly accepted threshold of 0.70, thus supporting the internal consistency of the measurement scales.

Data Analysis and Control Variables

The statistical procedure started with preliminary diagnostics, including evaluations of normal data distribution, common method bias, and scale validity and reliability by utilizing SPSS and AMOS programs, except using the Microsoft Excel program for calculating the HTMT ratio. Tests for multicollinearity were subsequently performed before proceeding to the main analysis. Structural Equation Modeling (SEM) using AMOS, coupled with path analysis and mediation testing, served as the primary analytical technique, while SPSS was employed for descriptive and preliminary statistics. Control variables were included to account for demographic impacts that may affect pro-environmental workplace behaviors. Previous studies have suggested that age can influence individual participation in sustainability-related activities (Pham et al., 2024), while gender has been related to differential levels of involvement, with female employees often showing higher engagement in sustainability programs compared to their male counterparts (Altassan & Ahmad, 2024; Islam et al., 2023). Educational attainment has also been underlined as a predictor of green behavior, as individuals with advanced degrees are often more capable of incorporating environmental considerations into their professional roles and research activities (Fawehinmi et al., 2020).

Results

The demographic characteristics of the respondents are summarized in Table 1, indicating that a slightly higher proportion of the participants were male, just over 53 percent. The majority

of respondents were between the ages of 27 and 58, equaling just over 77 percent, indicating a dominance of individuals within the mid-career and late-career stages. Educational types further indicated that a substantial portion of the sample held a PhD qualification, equaling over 44 percent, signifying a highly educated participant group.

Table 1 Sampled Participants' Profile

Variable	Category	Frequency	Percent
Gender	Women	186	46.5
	Men	214	53.5
Age Group	18-26	62	15.5
	27-42	144	36.0
	43-58	167	41.8
	59 or above	27	6.8
Education Type	High School	8	2.0
	Bachelor	46	11.5
	Master	156	39.0
	PhD	177	44.3
	Post-Doctoral	13	3.3

The assessment of data normality indicated that the skewness and kurtosis values fell within the recommended thresholds, ranging between -1.1 and 0.8 for skewness and -2.0 to 1.0 for kurtosis. These values align with the guidelines provided by Hair et al. (2019), signifying that the data follows a normal distribution pattern. Convergent validity was assessed by initially evaluating the factor loadings of each item. Items with loadings below the acceptable cutoff were discarded, after which composite reliability and Average Variance Extracted (AVE) values were computed. Both indices exceeded their respective minimum requirements, confirming the scale's convergent validity (shown in Table 2). Furthermore, the Heterotrait-Monotrait Ratio (HTMT) values were below the maximum acceptable limit of 0.85, thus verifying that discriminant validity was adequately achieved (Henseler et al., 2015).

The consistency of the measurement scale was further assessed using Cronbach's alpha values, all of which surpassed the generally accepted threshold of 0.6 (Henseler et al., 2015). This result demonstrated that the scale maintained acceptable reliability. Additionally, potential multicollinearity was examined through the Variance Inflation Factor (VIF) values. The VIF scores for the independent constructs, including GHRM (1.2) and GWE (1.2), remained well below the satisfactory value of 3.3 (Petter et al., 2007), indicating that multicollinearity did not pose a concern in the proposed structural model. Furthermore, the issue of Common Method Bias (CMB) was examined using Harman's single-factor test. The analysis indicated that the largest variance explained by a single factor was not over 42 percent, which is below the critical

threshold of 50 percent. This result provides evidence that CMB was not a significant issue in the study.

Table 2 Reliability and Validity

Dimension	CR	AVE	GWE	GHRM	In-role	Extra-role	Reliability
GWE	0.86	0.52	0.72	-	-	-	0.90
GHRM	0.91	0.63	0.40	0.80	-	-	0.87
In-role	0.90	0.74	0.63	0.41	0.86	-	0.89
Extra-role	0.86	0.68	0.60	0.41	0.53	0.82	0.86

Table 3 HTMT Ratio

HTMT RATIO	GWE	Extra-role	In-role	GHRM
GWE	-	-	-	-
Extra-role	0.52	-	-	-
In-role	0.57	0.37	-	-
GHRM	0.38	0.37	0.39	-

The SEM outcomes displayed in Table 4 reveal that the proposed framework demonstrated satisfactory goodness of fit, where the values of the chi-square to degrees of freedom ratio, the Goodness-of-Fit index (GFI), the Comparative Fit Index (CFI), and the Root Mean Square Error of Approximation (RMSEA) all fell within the thresholds recommended in the literature, thereby confirming the adequacy of the model fit (Kline, 2011). Furthermore, the findings highlight that GHRM and GWE exerted significant positive influences on employees' green behavioral outcomes. In examining the control variables, gender was the only factor that produced a statistically significant effect, whereas educational attainment and age did not yield sizeable impacts on employees' green behaviors. Consequently, these results provide empirical support for hypothesized relationships in H1-4, as shown in Figure 2.

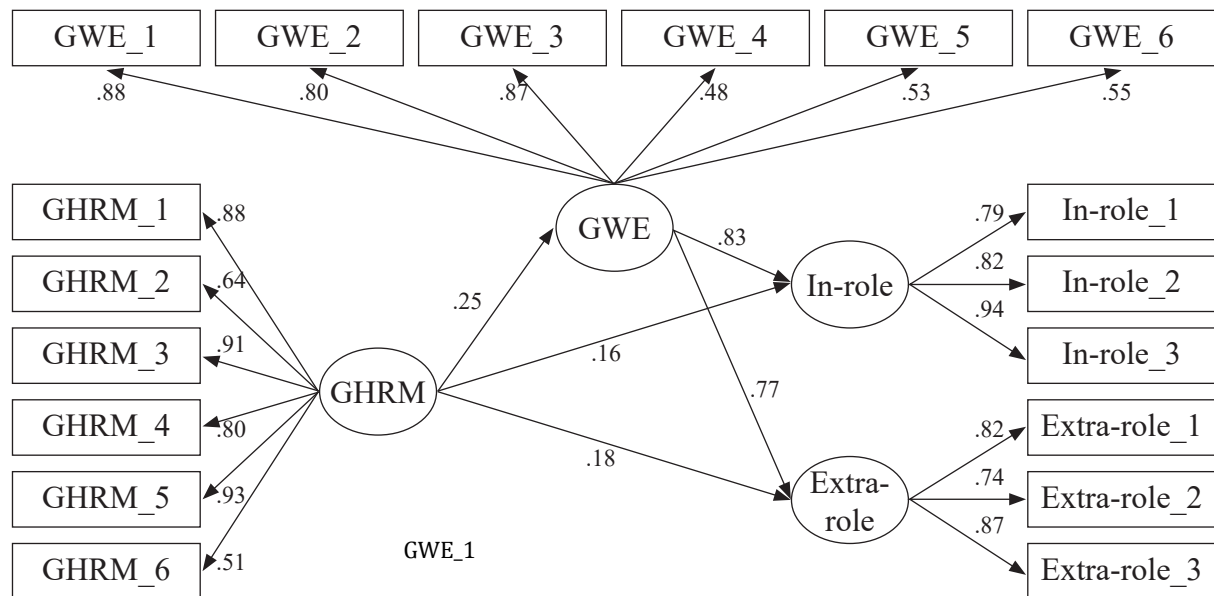


Figure 2 Modified Research Framework

Table 4 Path Analysis Estimate

			Estimate	S.E.	C.R.	P
GWE	<---	GHRM	.25	.04	6.8	***
In-role	<---	GWE	.83	.11	7.9	***
Extra-role	<---	GWE	.77	.11	7.3	***
In-role	<---	GHRM	.16	.05	3.2	.00
Extra-role	<---	GHRM	.18	.05	3.4	***
Extra-role	<---	Education	.12	.07	1.7	.08
Extra-role	<---	Gender	.38	.11	3.5	***
Extra-role	<---	Age	-.05	.07	-.78	.44
In-role	<---	Education	-.01	.06	-.18	.86
In-role	<---	Gender	.25	.10	2.5	.01
In-role	<---	Age	-.04	.06	-.59	.55

Source: Model fit indices: $\chi^2 = 3.58$ ($P < 0.00$), $df = 174$, $\chi^2/df = 1.76$, CFI = .97, GFI = .93, NFI = .94, TLI = .97, RMSEA = .04, *** = .001 significance level

The findings presented in Table 5 indicated that GWE exerts a stronger influence on employees' green behaviors compared to GHRM, although the direct relationships of both variables were statistically significant. Furthermore, the results indicate that the indirect impact of GHRM on employees' green behaviors, mediated through GWE, was greater than its direct influence. This finding suggests that GWE plays a partial mediating role in the relationship

between GHRM and employees' environmentally responsible actions. Consequently, both Hypothesis 5a and Hypothesis 5b are empirically validated.

Table 5 Mediating Effect of GWE

Relationship	Estimate	Bootstrapping		2-Tailed Significance
Bias-corrected 95% CI				
Direct Effects		LB	UB	
GHRM - GWE	.25	.16	.36	.001
GHRM - Extra-role	.18	.07	.28	.003
GHRM - In- role	.16	.05	.26	.008
GWE - Extra-role	.77	.58	1.00	.001
GWE - In- role	.83	.62	1.10	.001
Indirect Effects				
GHRM - Extra-role	.19	.13	.27	.000
GHRM - In- role	.21	.15	.29	.001

Discussion

The present study demonstrates that GHRM has a significant association with both in-role and extra-role environmentally responsible behaviors. This outcome is consistent with the findings of Dumont et al. (2017), who underlined the existence of a positive linkage between GHRM practices and employees' ecological conduct. The results also strengthen the relevance of SET, which posits that employees tend to reciprocate organizational support for environmental initiatives by engaging in job-specific as well as discretionary eco-friendly actions (Islam et al., 2021). Additionally, this research establishes a positive relationship between GHRM and GWE, aligning with the JDR framework that emphasizes how workplace resources foster motivation and involvement. Similar conclusions were also reported by Haque et al. (2024), who explained that exposure to sustainable HRM practices enhances employees' engagement at work. Further evidence from the current research reveals that GWE exerts positive impacts on both in-role and extra-role green behaviors. This suggests that employees who display higher levels of work engagement are more inclined to cultivate trusting relationships with their organizations, thereby resulting in environmentally responsible practices. Such findings are consistent with prior research, such as Ababneh (2021), who argued that engagement partially explains the association between GHRM and pro-environmental behaviors in organizational settings. Similarly, Kim et al. (2023) demonstrated that organizational leadership, when paired with GHRM practices, improves employee engagement and reinforces commitment to both mandatory and voluntary environmental activities. Moreover, the results underline the significant mediating role of GWE in the connection between GHRM and employees' ecological behaviors. This suggests that the influence of GHRM on workplace sustainability behaviors is not exclusively direct but also

functions through employees' engagement, as previously emphasized by Kania (2024). Similar evidence was also presented by Aboramadan (2022), who reported that GHRM practices not only enhance employee engagement but also promote pro-environmental behaviors, signifying that engagement serves as a crucial mechanism in translating organizational sustainability initiatives into employee action.

Conclusion

The present study advances the discussion on GHRM by positioning it under the context of higher education, a sector where academic attention remains relatively narrow despite rising worldwide interest in sustainability. While the GHRM literature continues to expand, prior research has accentuated the necessity of examining how such practices function in academic institutions, which serves a pivotal role in cultivating environmentally responsible cultures (Miah et al., 2024). Responding to this necessity, the study developed and empirically validated a conceptual framework that explores the interaction between GHRM practices and sustainable outcomes. Specifically, the research incorporated GWE not only as a predictor but also as a mediation factor, thus offering a more nuanced understanding of its impact on green behaviors. This approach differs from the present work from earlier studies that relied on alternative mediators such as green knowledge, green passion, or empowerment (Miah et al., 2024). Additionally, unlike previous studies that tended to isolate obligatory work-related environmental actions from voluntary citizenship-oriented practices, this study simultaneously considered both forms of behavior as outcomes of GHRM (Wang et al., 2025). From a managerial viewpoint, the findings underline the necessity for higher education institutions to adopt proactive green strategies and institutionalize them within their operational frameworks. Universities and colleges, in particular, can position their workforce as advocates of sustainability by implementing GHRM practices into daily organizational routines. Implementing policies that strengthen workplace green behaviors enables these institutions to address ecological challenges more effectively, thereby contributing not only to organizational success but also to broader social sustainability. This requires HR professionals to integrate environmentally oriented initiatives into other strategic HRM priorities, such as performance and commitment-based systems. Importantly, such initiatives should extend beyond symbolic actions and encompass systematic staffing approaches, tailored green training programs, robust performance evaluation mechanisms, and comprehensive reward structures that motivate environmentally responsible behavior.

Limitations and Future Research

While the present research provides valuable contributions, several limitations require careful consideration. First, the study results rely exclusively on employees' self-reported responses, which introduces the possibility of social desirability and subjective bias that may influence the accuracy of the results. Second, the dataset was derived from a selected group of HEIs located within a single first-tier city in China, thus narrowing the diversity of perspectives and institutional contexts. Third, the cross-sectional nature of the design limits the capacity to establish definitive causal relationships between the proposed predictors and the observed outcomes. Fourth, the analysis focused solely on one mediating construct, GWE, in explaining the linkage between GHRM and employees' green behavioral outcomes, leaving other potential

factors unexplored. Finally, because the sample was confined to the context of Chinese HEIs, the extent to which the findings can be generalized to other industrial sectors or cultural environments remains limited. These limitations simultaneously highlight several promising areas and aspects for future research. First of all, to address the issue of self-reported bias, future studies could integrate multiple sources of evidence information including supervisor evaluations, peer assessments, interviews, or objective behavioral indicators, thus increasing the robustness of conclusions. Secondly, to improve the external validity of the findings, collecting broader samples to encompass HEIs across diverse regions and economic tiers within China would be beneficial. Moreover, cross-national or cross-cultural comparative studies could provide richer insights into the ways institutional and cultural contexts shape the effectiveness of GHRM practices. Thirdly, employing longitudinal research designs would also allow capturing relationship dynamics in employees' green behaviors and make stronger inferences about the causal connection between GHRM, GWE, and behavioral outcomes. Fourthly, besides GWE, future studies should examine alternative mediation factors, including perceptions of organizational green support, the role of environmentally oriented leadership, or the influence of green workplace climate, to construct a more holistic framework under which GHRM operates. Furthermore, examining moderation influences such as employees' levels of environmental commitment or the organization's adaptive green capacities could help to specify boundary conditions of GHRM effectiveness. Lastly, extending research to other industries, including manufacturing, healthcare, and the public sector, would discover sector-specific challenges and opportunities, thereby contributing to a more comprehensive understanding of the applicability and impact of GHRM across diverse organizational landscapes.

Recommendation

From the study's outcomes, several recommendations can be put forward for both scholars and managerial professionals. First, higher education institutions should normalize GHRM within core HRM policies to stimulate both in-role and extra-role green behaviors. In the case of Chinese universities, this could involve the creation of dedicated sustainability teams responsible for overseeing the design and execution of green strategies. Recruitment efforts should favor candidates who possess pro-environmental values and proficiencies, while training and professional development initiatives can be modified to strengthen employees' environmental knowledge and skills, allowing them to contribute significantly both within and outside their current roles. Furthermore, universities can integrate sustainability metrics into appraisal systems and offer both financial and non-financial rewards, such as additional leave or professional growth opportunities, to encourage behaviors like paper conservation and energy efficiency. Second, the recognition of GWE as a key mediating factor between GHRM and green outcomes highlights the importance of cultivating an institutional climate that vigorously supports employee engagement in sustainability. This can be achieved by fostering collaborative innovation hubs, rewarding employee-inspired environmental initiatives, and encouraging participatory decision-making in sustainability-related policy development. Establishing partnerships across universities and with external parties, including governmental agencies, industries, and international organizations, can further promote the exchange of knowledge and industrial best practices. Initiatives such as multi-disciplinary conferences, joint research collaborations, and community-focused environmental projects can deepen engagement and

broaden the impact of green behaviors. Universities may also benefit from employing subtle behavioral interventions, such as reminders to minimize printing, provision of waste sorting and recycling facilities, and promotion of adopting digital platforms, all of which can enhance GWE and lower ecological footprints in higher education settings. Finally, universities should establish continuing monitoring systems to evaluate the effectiveness of GHRM initiatives. Regular environmental audits, collection of employee feedback on the effectiveness of sustainability programs, and benchmarking against international best practices can provide valuable insights for continuous improvement. By implementing such evaluative mechanisms, Chinese HEIs can refine their strategies, strengthen accountability, and move toward achieving long-term sustainability targets.

Reference

- Ababneh, O. M. A. (2021). How do green HRM practices affect employees' green behaviors? The role of employee engagement and personality attributes. *Journal of Environmental Planning and Management*, 64(7), 1204-1226. <https://doi.org/10.1080/09640568.2020.1814708>
- Aboramadan, M. (2022). The effect of green HRM on employee green behaviors in higher education: The mediating mechanism of green work engagement. *International Journal of Organizational Analysis*, 30(1), 7-23. <https://doi.org/10.1108/IJOA-05-2020-2190>
- Abualigah, A., Koburtay, T., Bourini, I., Badar, K., & Gerged, A. M. (2023). Towards sustainable development in the hospitality sector: Does green human resource management stimulate green creativity? A moderated mediation model. *Business Strategy and the Environment*, 32(6), 3217-3232. <https://doi.org/10.1002/bse.3296>
- Adu Sarfo, P., Zhang, J., Nyantakyi, G., Lassey, F. A., Bruce, E., & Amankwah, O. (2024). Influence of green human resource management on firm's environmental performance: Green employee empowerment as a mediating factor. *Plos One*, 19(4), e0293957. <https://doi.org/10.1371/journal.pone.0293957>
- Albrecht, S. L., Donnelly, T., Frenkiel, M., Rajic, S. K., Kavadas, V., & Leiter, M. P. (2023). Pro-environmental employee engagement: The influence of pro-environmental psychological capital, pro-environmental job resources, and perceived corporate environmental responsibility. *Frontiers in Sustainability*, 4, 1117892. <https://doi.org/10.3389/frsus.2023.1117892>
- Altassan, M. A., & Ahmad, A. (2024). Green threads of change: Unravelling the gendered and experienced moderators in the sustainable symphony of green HR practices and environmental responsibility. *International Journal of Innovative Research and Scientific Studies*, 7(2), 852-862. <https://doi.org/10.53894/ijirss.v7i2.2956>
- Amah, O. E. (2020). Innovative work behaviors: Role of employee engagement and organizational citizenship behaviors. *Indian Journal of Industrial Relations*, 56(2), 356-373. <https://www.jstor.org/stable/27199331>
- Bakker, A. B., Albrecht, S. (2018). Work engagement: Current trends. *Career Development International*, 23(1), 4-11. <https://doi.org/10.1108/CDI-11-2017-0207>
- Ba, Y., & Cao, L. (2023). Assessing the impact of green human resource management practices on environmental performance in China: Role of higher education. *Environmental Science and Pollution Research*, 30(41), 94386-94400. <https://doi.org/10.1007/s11356-023-28523-8>

- Bissing-Olson, M. J., Iyer, A., Fielding, K. S., & Zacher, H. (2013). Relationships between daily affect and pro-environmental behavior at work: The moderating role of pro-environmental attitude. *Journal of Organizational Behavior*, 34(2), 156-175. <https://doi.org/10.1002/job.1788>
- Blau, P. M. (1964). Justice in social exchange. *Sociological Inquiry*, 34(2). <https://doi.org/10.1111/j.1475-682X.1964.tb00583.x>
- Bui, H. T. M., Bui, T., & Pham, B. T. (2024). The role of higher education in achieving sustainable development goals: An evaluation of motivation and capacity of Vietnamese institutions. *The International Journal of Management Education*, 22(3), 101088. <https://doi.org/10.1016/j.ijme.2024.101088>
- CEIC. (2023). *Air Quality: PM2.5 Concentration: Monthly Average: Shenyang*. <https://www.ceicdata.com/en/china/air-quality-pm25-concentration-city/air-quality-pm25-concentration-monthly-average-shanghai>
- Chatelain, G., Hille, S. L., Sander, D., Patel, M., Hahnel, U. J. J., & Brosch, T. (2018). Feel good, stay green: Positive affect promotes pro-environmental behaviors and mitigates compensatory “mental bookkeeping” effects. *Journal of Environmental Psychology*, 56, 3-11. <https://doi.org/10.1016/j.jenvp.2018.02.002>
- Chen, L., Luo, F., Zhu, X., Huang, X., & Liu, Y. (2020). Inclusive leadership promotes challenge-oriented organizational citizenship behavior through the mediation of work engagement and moderation of organizational innovative atmosphere. *Frontiers in Psychology*, 11, 560594. <https://doi.org/10.3389/fpsyg.2020.560594>
- Dumont, J., Shen, J., & Deng, X. (2017). Effects of green HRM practices on employee workplace green behavior: The role of psychological green climate and employee green values. *Human resource management*, 56(4), 613-627. <https://doi.org/10.1002/hrm.21792>
- Ercantan, O., & Eyupoglu, S. (2022). How do green human resource management practices encourage employees to engage in green behavior? Perceptions of university students as prospective employees. *Sustainability*, 14(3), 1718. <https://doi.org/10.3390/su14031718>
- Fawehinmi, O., Yusliza, M. Y., Ogbeibu, S., Tanveer, M. I., & Chiappetta Jabbour, C. J. (2022). Academic employees’ green behaviour as praxis for bolstering environmental sustainable development: A linear moderated mediation evaluation. *Business Strategy and the Environment*, 31(7), 3470-3490. <https://doi.org/10.1002/bse.3095>
- Fawehinmi, O., Yusliza, M. Y., Wan Kasim, W. Z., Mohamad, Z., & Sofian Abdul Halim, M. A. (2020). Exploring the interplay of green human resource management, employee green behavior, and personal moral norms. *Sage Open*, 10(4), 2158244020982292. <https://doi.org/10.1177/2158244020982292>
- Fredrickson, B. L. (2001). The role of positive emotions in positive psychology: The broaden-and-build theory of positive emotions. *American Psychologist*, 56(3), 218-226. <https://doi.org/10.1037/0003-066X.56.3.218>
- Gilal, F. G., Ashraf, Z., Gilal, N. G., Gilal, R. G., & Channa, N. A. (2019). Promoting environmental performance through green human resource management practices in higher education institutions: A moderated mediation model. *Corporate Social Responsibility and Environmental Management*, 26(6), 1579-1590. <https://doi.org/10.1002/csr.1835>

- Hair, J. F., Risher, J. J., Sarstedt, M., & Ringle, C. M. (2019). When to use and how to report the results of PLS-SEM. *European Business Review*, 31(1), 2-24. <https://doi.org/10.1108/EBR-11-2018-0203>
- Henseler, J., Ringle, C. M., & Sarstedt, M. (2015). A new criterion for assessing discriminant validity in variance-based structural equation modeling. *Journal of the Academy of Marketing Science*, 43, 115-135. <https://doi.org/10.1007/s11747-014-0403-8>
- Haque, M. A., Islam, M. A., & Soh, S. (2024). Green HRM practices and green work engagement: The roles of green knowledge sharing and green group cohesion. *Global Business and Organizational Excellence*, 44(1), 1-16. <https://doi.org/10.1002/joe.22266>
- Islam, M. A., Hossain, M. S., Hoque, M. E., Khan, T., & Hassan, M. M. (2023). The moderating role of gender and employee championing behaviour in the relationship between green human resource management practices and sustainable organisational performance: Evidence from Bangladesh. In O. D. Adekoya, C. Mordi, & H. A. Ajonbadi (Eds) *Global Perspectives on Green HRM (127-153)*. Palgrave Macmillan, Cham. https://doi.org/10.1007/978-3-031-35795-4_6
- Islam, T., Khan, M. M., Ahmed, I., & Mahmood, K. (2021). Promoting in-role and extra-role green behavior through ethical leadership: Mediating role of green HRM and moderating role of individual green values. *International Journal of Manpower*, 42(6), 1102-1123. <https://doi.org/10.1108/IJM-01-2020-0036>
- Kania, D. (2024). Green human resource management and green behavior: Mediating work engagement. *International Journal of Applied Finance and Business Studies*, 12(1), 19-27. <https://doi.org/10.35335/ijafibs.v12i1.275>
- Kim, T. T., Kim, W. G., Majeed, S., & Haldorai, K. (2023). Does green human resource management lead to a green competitive advantage? A sequential mediation model with three mediators. *International Journal of Hospitality Management*, 111, 103486. <https://doi.org/10.1016/j.ijhm.2023.103486>
- Kline, R. B. (2011). Principles and practice of structural equation modeling (3. Baskı). Guilford Press.
- Marini, M., Handoyo, S., & Sukadiono, S. (2023). Green Work Engagement: A Literature Review. *RSF Conference Series: Business, Management and Social Sciences*, 3(3), 179-185. <https://doi.org/10.31098/bmss.v3i3.662>
- Miah, M., Szabó-Szentgróti, G., & Walter, V. (2024). A systematic literature review on green human resource management (GHRM): An organizational sustainability perspective. *Cogent Business & Management*, 11(1), 2371983. <https://doi.org/10.1080/23311975.2024.2371983>
- Mou, X., Kelana, B. W. B. Y., Jie, C., & Mahmood, A. (2024). Linking GHRM to environmental performance through green behaviour in Private Chinese Universities. *International Journal of Academic Research in Business and Social Sciences*, 14(12), 4419-4439. <https://doi.org/10.6007/IJARBS/v14-i12/24412>
- Nabi, T., Joshi, A., Malik, S. H., Siddiqui, M. A., & YETGIN, M. A. (2023). Nexus between green human resource management and environmental practices: An empirical study using structural equation modelling. *Research Square*, 9(1), 1-27. <https://doi.org/10.21203/rs.3.rs-3394470/v1>

- Ojo, A. O., Tan, C. N. L., & Alias, M. (2022). Linking green HRM practices to environmental performance through pro-environment behaviour in the information technology sector. *Social Responsibility Journal*, 18(1), 1-18. <https://doi.org/10.1108/SRJ-12-2019-0403>
- Oliveira, M. C., & Proenca, J. (2025). Sustainable campus operations in higher education institutions: A systematic literature review. *Sustainability*, 17(2), 607. <https://doi.org/10.3390/su17020607>
- Pham, S. L., Hoang, V. H., Ngo, Q. D., & Pham, H. H. (2024). *Unveiling the drivers of green purchase intention in Vietnam: The moderating role of environmental consciousness and perceived consumer effectiveness*. *Journal of Ecohumanism*, 3(7), 1163-1178. <https://doi.org/10.62754/joe.v3i7.4278>
- Petter, S., Straub, D., & Rai, A. (2007). Specifying formative constructs in information systems research. *MIS Quarterly*, 31(4), 623-656. <https://doi.org/10.2307/25148814>.
- Schaufeli, W. B., Bakker, A. B., & Salanova, M. (2006). The measurement of work engagement with a short questionnaire: A cross-national study. *Educational and psychological measurement*, 66(4), 701-716. <https://doi.org/10.1177/0013164405282471>
- Sharif, S., Malik, S. A., Arooj, N., & Albadry, O. M. (2024). Human Resource Management (HRM) practices and organizational commitment in Higher Educational Institutions (HEI): A mediating role for work engagement. *Global Knowledge, Memory and Communication*, Advance online publication. <https://doi.org/10.1108/GKMC-11-2023-0456>
- Susanto, A. (2023). The role of Green Human Resources Management (GHRM) on Job satisfaction and Green Work Engagement (GWE): An empirical study on manufacturing industries. *Journal of Economics, Finance and Management Studies*, 6(3), 1123-1131. <https://doi.org/10.47191/jefms/v6-i3-11>
- Tirno, R. R., Islam, N., & Happy, K. (2023). Green HRM and ecofriendly behavior of employees: Relevance of proecological climate and environmental knowledge. *Heliyon*, 9(4). e14632. <https://doi.org/10.1016/j.heliyon.2023.e14632>
- Wang, Y., Umam, R., Qureshi, T. M., Haq, Ul. J., & Bonn, M. A. (2025). Employee sustainability: How green practices drive employee well-being and citizenship behavior. *Sustainability*, 17(3), 936. <https://doi.org/10.3390/su17030936>
- Yadate, D. A. (2025). The effect of green human resource management on employee green behavior. *Corporate Social Responsibility and Environmental Management*, 32(1), 404-418. <https://doi.org/10.1002/csr.2956>
- Yamane, T. (1973). *Statistics: An introductory analysis*. (3rd ed.). Harper and Row.
- Yong, J. Y., Yusliza, M. Y., & Fawehinmi, O. O. (2020). Green human resource management: A systematic literature review from 2007 to 2019. *Benchmarking: An International Journal*, 27(7), 2005-2027. <https://doi.org/10.1108/BIJ-12-2018-0438>
- Zhang, S., Chen, M., & Tang, G. (2024). How green human resource management can promote green competitive advantage: The role of green innovation. *Business Strategy and the Environment*, 33(5), 4613-4625. <https://doi.org/10.1002/bse.3715>