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Green organizational levers and faculty sustainable behavior in higher education: The mediating role of sustainable attitude

Misbah Habib*[1], Professor Dr. Ida M. Yasin[2], and Dr. Raemah Abdullah Hashim[3]

[1 2 3] Putra Business School, Universiti Putra Malaysia, Malaysia

[1]Forman Christian College University, Pakistan

Email: ida@putrabs.edu.my[2]; raemah@putrabs.edu.my[3]

*Correspondence: misbahhabib2@gmail.com; ORCID: 0009-0005-7081-3378

Abstract

Environmental degradation and the imperative to achieve the Sustainable Development Goals have intensified pressure on higher education institutions (HEIs) to move beyond symbolic sustainability commitments and embed sustainable practices within their organizational systems. Yet the mechanisms through which green organizational inputs translate into faculty sustainable behavior (ESB) remain inadequately understood, particularly in developing country contexts. Drawing on Ability-Motivation-Opportunity (AMO) theory and Social Information Processing (SIP) theory, this study develops and tests a theoretically integrated model in which green human resource management (GHRM) and green organizational culture (GOC) influence ESB among university faculty, with sustainable attitude (SA) proposed as the mediating psychological mechanism. Survey data from 380 faculty members across public and private universities in Punjab, Pakistan, were analyzed using partial least squares structural equation modeling (PLS-SEM). Results confirm that both GHRM and GOC positively and significantly predict ESB. SA mediates both relationships, with the indirect effect being substantially stronger for GHRM than for GOC, consistent with theoretical expectations regarding the distinct pathways through which structured HR practices and cultural norms shape employee attitudes. The model accounts for 52.9% of the variance in ESB and demonstrates strong out-of-sample predictive relevance. These findings extend understanding of sustainability behavior in professional, autonomy-driven academic environments and offer actionable guidance for university administrators and policymakers seeking to institutionalize faculty engagement with sustainability beyond compliance.

***Keywords*:** Green Human Resource Management, Green Organizational Culture, Sustainable Attitude, Employee Sustainable Behavior, Higher Education Institutions, Pakistan, PLS-SEM

JEL Classification: M12, M14, Q56

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1. Introduction

The past decade has witnessed a striking contradiction in organizational sustainability as environmental commitments have grown more ambitious while the behavioral practices of employees have struggled to keep pace. Organizations across industries have adopted green strategies, sustainability charters, and environmental targets, yet the translation of these institutional intentions into consistent employee behavior remains a persistent challenge (Katz et al., 2022; Prodromou et al., 2025). This matters because sustainability outcomes are ultimately produced at the individual level by the cumulative weight of daily decisions about energy use, resource consumption, waste generation, and environmental initiatives (Ones & Dilchert, 2012). Accelerating ecological pressures, from biodiversity loss to resource depletion to the compounding risks of climate change, have made it increasingly urgent for organizations to understand what drives employees to act sustainably and what prevents them from doing so (Zacher et al., 2023; Block et al., 2024). It is within this context that employee sustainable behavior (ESB) has emerged as a construct of both theoretical significance and practical consequence (Hamdan et al., 2024). Scholarly attention has consequently shifted from macro-level policy adoption toward the individual-level behaviors through which sustainability is operationalized in practice. Higher education institutions (HEIs) constitute a particularly significant yet empirically underexplored context within the sustainability discourse. Globally, universities have come under increasing scrutiny for their environmental footprints, with institutions in Europe, North America, and Asia advancing structured sustainability agendas in alignment with the Sustainable Development Goals (SDGs) (Filho et al., 2025; UNESCO, 2024). Although universities may generate less carbon footprint than manufacturing sectors, they exert a considerable environmental impact through energy-intensive campuses, complex supply chains, and high-volume resource consumption (Christou et al., 2024). Beyond their environmental footprint, HEIs serve as centers of knowledge, sustainability education, and community engagement, enabling them to shape individual behavior and broader societal norms toward sustainability. Through teaching, research, and community outreach, HEIs have the potential to cultivate the sustainable competencies and values that are essential for long-term societal transformation, making their active involvement indispensable to meaningful progress toward the SDGs.

Faculty members occupy a central role in this regard. As the primary human resource of HEIs, they not only influence environmental outcomes through their daily work practices but also transmit sustainability-related values and professional norms to students who carry these orientations into diverse sectors of the economy (Christou et al., 2024; UNESCO, 2024). Consequently, faculty engagement in sustainable workplace behaviors has implications that extend beyond institutional boundaries, linking individual actions to broader societal progress toward the SDGs (Hamdan et al., 2024; Leal Filho et al., 2023). Progress toward the SDGs therefore depends not only on what universities teach, but on how their academic communities behave, making faculty ESB a matter of strategic institutional and societal importance.

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Within this global imperative, Pakistan represents a context of particular salience and urgency. The country consistently ranks among the most environmentally stressed nations in the world, facing compounding pressures from deteriorating air quality, water scarcity, deforestation, and climate-induced disasters, while simultaneously recording weak progress against the SDGs. Its higher education sector has expanded substantially over the past two decades, with over 200 universities now operating across the country, yet this institutional growth has not been accompanied by commensurate attention to sustainability governance or faculty behavioral engagement (HEC, 2023; Hinduja et al., 2023). Sustainability efforts in Pakistani HEIs tend to be fragmented, externally driven, and rarely embedded in the organizational systems and cultural frameworks that shape everyday faculty conduct (Shaheen et al., 2024; Abiddin, 2024). This combination of acute environmental need and weak institutional sustainability infrastructure makes Pakistan a critical yet understudied context for examining what enables faculty to adopt and sustain green behaviors at work.

A growing body of research has examined the organizational conditions that enable or constrain ESB, with two mechanisms receiving considerable attention. Green human resource management (GHRM) has been shown to influence employees' environmental engagement by embedding sustainability into core people management processes, creating conditions in which ESB is both supported and expected (Dumont et al., 2017). Green organizational culture (GOC) has similarly been linked to stronger employee environmental engagement, operating through the shared values and behavioral norms that define how organizational members understand and respond to sustainability expectations (Al-Swidi et al., 2021). However, most studies have examined these mechanisms in isolation and within manufacturing or hospitality contexts. In addition, the primary focus has been on firms' overall environmental performance rather than individual employee behavior. Moreover, these studies have often overlooked the psychological processes through which organizational inputs are translated into behavioral outputs. The attitudinal mechanisms linking green organizational practices to employee behavior in HEI contexts remain poorly understood. Sustainable attitude (SA) has been proposed as a psychologically proximal antecedent of ESB, capturing employees' evaluative stance toward sustainability that shapes how they interpret and respond to organizational green signals (Blok et al., 2015). Despite its theoretical relevance as a mediating mechanism, SA has rarely been examined as one of the pathways through which both GHRM and GOC may exert their behavioral effects, particularly within academic institutions in developing economies. This gap is important because, beyond formal structures and cultural cues, employees' psychological orientations can play a meaningful role in strengthening sustained behavioral change, especially in professional environments such as universities where autonomy is high, formal monitoring is limited, and discretionary behavior carries significant institutional weight (Farooq et al., 2024). This study addresses this gap by investigating whether and how SA mediates the relationships between GHRM, GOC, and ESB among faculty members in Pakistani HEIs, drawing on Ability-Motivation-Opportunity (AMO) theory and Social

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Information Processing (SIP) theory as the theoretical anchors. In doing so, it advances understanding of the psychological pathways through which green organizational mechanisms may influence faculty behavior while also offering practical guidance for universities seeking to move beyond symbolic sustainability commitments toward genuine behavioral transformation.

2. Literature Review and Hypothesis Development

2.1 Theoretical Framework

This study is grounded in two theoretical perspectives, Ability-Motivation-Opportunity (AMO) theory and Social Information Processing (SIP) theory, which together provide a coherent explanation of how organizational mechanisms shape ESB in HEIs. AMO theory posits that employees are more likely to demonstrate desired behaviors when they possess the necessary abilities, are motivated to act, and are provided with opportunities to perform (Appelbaum et al., 2000). Within this study, GHRM reflects these AMO components by developing employees' environmental competencies, strengthening motivation through green appraisal and rewards, and creating opportunities for faculty to participate in sustainability initiatives. AMO theory therefore provides the foundation for understanding how GHRM contributes to the development of ESB through ability-enhancing, motivating, and opportunity-creating mechanisms. Complementing this structural perspective, SIP theory emphasizes the role of social cues and contextual information in shaping employee attitudes and behaviors (Salancik & Pfeffer, 1978). GOC serves as a key source of such cues by embedding shared environmental norms and expectations within the institutional environment, signaling to employees that sustainability is valued and expected. When sustainability is woven into organizational norms, symbols, and shared narratives, employees receive consistent informational cues that shape their sustainability-related evaluations. Over time, these cultural cues contribute to the formation of positive SA, which subsequently guides ESB. SIP theory therefore explains how green culture signals influence the way faculty understand, internalize, and enact sustainable behavior. Together, these perspectives suggest that GHRM and GOC are significant predictors of ESB in HEIs, and that SA serves as the critical psychological mechanism through which these organizational inputs translate into behavioral outcomes.

2.2 GHRM and ESB

GHRM comprises a set of HR practices, including green recruitment, training, performance management, and rewards, through which environmental priorities are systematically integrated into HR systems (Dumont et al., 2017). Drawing on the AMO framework, these practices collectively develop environmental competence through training and selection, strengthen motivation through evaluation and rewards, and create opportunities through participation and policy communication, thereby establishing the conditions under which ESB can be enacted (Appelbaum et al., 2000; Marin-Garcia & Tomas, 2016; Prodromou et al., 2025). Empirical studies across tourism, manufacturing, and education sectors consistently associate GHRM with in-role and extra-role sustainable behaviors (Yuan et al., 2024; Habib et al., 2026), with stronger effects

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observed when practices are implemented as an integrated bundle rather than in isolation (Fawehinmi et al., 2024).

Findings, however, are not uniformly positive. Several studies report weak or insignificant GHRM–ESB relationships in the absence of supportive cultural and contextual mechanisms (Al-Swidi et al., 2021; Abbas & Dogan, 2022), suggesting that AMO components must operate simultaneously for HR systems to translate into behavior. This boundary condition is particularly relevant for HEIs in developing economies, where formal GHRM systems and sustainability structures are still evolving, and faculty operate under decentralized authority, professional autonomy, and limited compliance-based monitoring that distinguish them from corporate settings (Anwar et al., 2020; Arshad et al., 2023; Hinduja et al., 2023). Embedding sustainability within recruitment, faculty development, appraisal, and reward systems signals environmental responsibility as institutionally legitimate and helps reduce the symbolic-policy gap that may otherwise constrain ESB. Accordingly:

H1: GHRM positively influences ESB.

2.3 GOC and ESB

GOC reflects shared environmental values and norms that guide how employees interpret and respond to sustainability expectations. Studies consistently show that organizations with strong GOC foster environmental consciousness and sustainable behavior among employees (Aslam et al., 2024; Luu, 2024). Such cultures create a collective mindset that supports green initiatives and encourages members to act in ways that contribute to broader sustainable communities (Abbas & Dogan, 2022). Empirical research further demonstrates that GOC enhances ESB both directly, by embedding environmental priorities into daily routines, and indirectly, by shaping psychological conditions that reinforce ESB (Al-Swidi et al., 2021; Karmoker et al., 2024). Existing research in HEIs remains limited, particularly in developing regions where environmental awareness and institutional sustainability structures are still uneven. SIP theory suggests that a strong GOC provides employees with clear environmental cues that signal sustainability as a shared norm, shaping their behavior accordingly (Salancik & Pfeffer, 1978). The influence of GOC is particularly salient in HEIs, where formal monitoring and enforcement mechanisms are often limited and professional autonomy is high. In such contexts, shared norms and cultural expectations play a critical role in guiding discretionary behavior (Leal Filho et al., 2023). Faculty members are more likely to engage in sustainable practices when environmental responsibility is embedded in institutional culture and reinforced through collegial interaction, shared values, and symbolic practices. However, despite the growing importance of sustainability in higher education, empirical research examining the GOC–ESB relationship in HEIs, particularly in developing countries, remains limited. Since organizational culture has been shown to strongly influence sustainable behavior, GOC is expected to have a positive effect on ESB.

H2: GOC positively influences ESB.

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2.4 Sustainable Attitude and ESB

SA refers to an individual's evaluative orientation toward environmental sustainability issues, reflecting agreement or disagreement with environmentally responsible actions and practices (Tian et al., 2020). Prior literature conceptualizes SA as a multidimensional construct comprising cognitive, affective, and behavioral intention components (Opatha & Kottawatta, 2020; Milfont & Duckitt, 2010). Within organizational sustainability research, SA has emerged as a critical psychological antecedent of ESB. Employees who hold positive sustainability-related orientations are more likely to engage in discretionary ESB, particularly in contexts where formal enforcement mechanisms are weak (Blok et al., 2015). Empirical studies in organizational settings consistently support a positive association between SA and ESB, demonstrating that favorable sustainability evaluations strengthen employees' intentions and increase the likelihood that these intentions are translated into actual behavior (Han et al., 2020; Kim et al., 2023). In HEIs, where faculty members operate with high professional discretion and limited direct supervision, internalized sustainability orientations play a decisive role in guiding discretionary behavior. From a SIP theory perspective, SA reflects the internalization of repeated organizational and cultural sustainability cues. Once internalized, these attitudes function as psychological reference points that guide behavioral responses, making SA a key mechanism through which organizational signals translate into ESB (Salancik & Pfeffer, 1978).

H3: SA positively and significantly influences ESB.

2.5 Mediating Role of SA between GHRM and ESB

GHRM is expected to cultivate SA through several mechanisms. Green training programs directly enhance employees' environmental knowledge and cognitive evaluations. Green performance appraisals and reward systems signal that sustainability is organizationally valued, generating positive affective orientations. Involving employees in sustainability initiatives provides experiential learning that reinforces normative responsibility toward environmental action (Pham et al., 2019; Opatha & Kottawatta, 2020; Shaban, 2019). From an AMO perspective, GHRM-induced capability and motivational development become internalized as favorable SA, reflecting the attitudinal dimension of motivation. Empirical support is provided by Pham et al. (2019), who found that green HR practices foster pro-environmental attitudes, and by Hameed et al. (2020), who demonstrated that environmental attitudes mediated the relationship between GHRM and employee green behaviors in Pakistani service organizations. Although prior research has examined attitudinal mediators between GHRM and ESB, the evidence remains fragmented and conceptually narrow. Existing studies have largely studied environmental concern (Fawehinmi et al., 2020), green commitment (Aboramadan & Karatepe, 2021), or environmental passion (Yuan et al., 2024), each capturing only a partial dimension of employees' sustainability orientation. SA, as conceptualized in this study, integrates the cognitive, affective, and normative dimensions of environmental evaluation into a single construct, offering a more theoretically complete mediator

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than the unidimensional attitudinal variables used in prior work. Equally important, the GHRM–SA–ESB pathway has rarely been examined in HEIs in developing economies, where faculty autonomy, collegial governance, and the absence of compliance-based monitoring fundamentally alter how GHRM exerts behavioral influence. In such contexts, GHRM cannot operate solely through formal incentives; its effectiveness depends almost entirely on whether it reshapes faculty members' SA. Testing this mediation in Pakistan's HEIs therefore not only addresses an empirical gap but also offers a stronger theoretical test of the attitudinal pathway under conditions where SA is the principal mechanism through which GHRM can generate sustained ESB.

H4: SA positively and significantly mediates the relationship between GHRM and ESB.

2.6 Mediating Role of SA between GOC and ESB

GOC shapes SA through the social cues it creates, consistent with SIP theory logic. When sustainability is embedded in organizational norms, symbols, shared practices, and peer behaviors, employees receive consistent informational cues that shape their sustainability-related evaluations (Salancik & Pfeffer, 1978). Through repeated exposure to environmentally oriented norms and peer modeling of sustainable practices, employees internalize sustainability as a personally relevant and morally appropriate standard, strengthening all three dimensions of SA (Chen et al., 2020; Luu, 2024). Bhutto et al. (2021) found that employees' perceptions of GOC influence ESB through SA, while Luu (2024) similarly demonstrated that GOC strengthens sustainability orientations, which subsequently promote ESB. Aboramadan (2022) found that GOC fosters employees' environmental commitment and SA, which subsequently translate into voluntary ESB in non-profit organizations. Mirahsani et al. (2024) similarly reported that GOC strengthens employees' environmental orientations, which mediate the link between cultural embedding and discretionary ESB in service contexts. Karmoker et al. (2024) further demonstrated that GOC enhances employees' environmental concern and identification with sustainability goals, both of which serve as proximal psychological drivers of ESB in emerging-economy settings. Collectively, these studies indicate that GOC's behavioral influence is largely indirect and operates through the attitudinal internalization of cultural cues rather than through normative pressure alone. In HEIs, where peer norms and professional identity are particularly influential, GOC plays a critical role in shaping SA, which further influences ESB.

H5: SA positively and significantly mediates the relationship between GOC and ESB.

Figure 1 presents the conceptual model integrating these hypothesized relationships.

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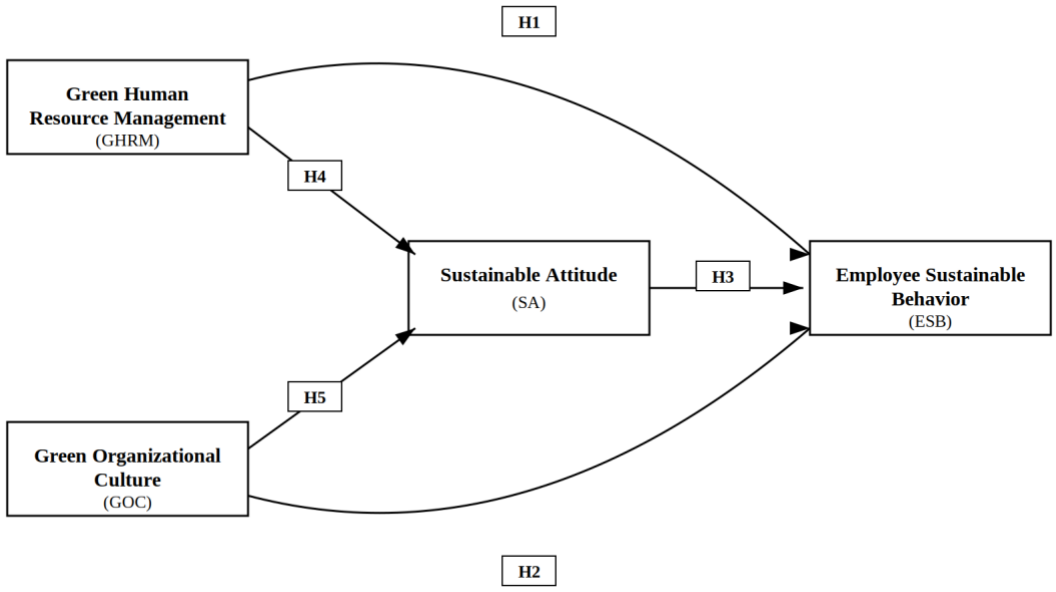
Figure 1. Conceptual Model



3. Methodology

3.1 Research Design and Sampling

This study adopted a quantitative, cross-sectional, explanatory research design to examine the hypothesized relationships among GHRM, GOC, SA, and ESB. Data were collected through a self-administered online questionnaire (Google Forms) distributed via institutional mailing lists and professional networks, complemented by printed questionnaires disseminated across selected public and private universities in Punjab, Pakistan. A non-probability purposive sampling technique was employed, as no complete sampling frame exists for full-time faculty members across the province (Etikan et al., 2016). Inclusion criteria required respondents to be full-time faculty employed in a public or private university located within Punjab, with a minimum tenure of one year to ensure adequate exposure to organizational practices (Bhutto et al., 2021). An a priori power analysis using G*Power 3.1, with a medium effect size ($f^2 = 0.15$), significance level of 0.05, statistical power of 0.80, and three predictors as the maximum number of paths entering any single construct, indicated a minimum sample requirement of 77 respondents (Hair et al., 2022). The final dataset of 380 valid responses substantially exceeded this threshold. Larger samples are particularly beneficial for PLS-SEM, as they enhance parameter stability, reduce standard-error bias, and improve bootstrapping precision in models involving multiple predictors and mediation effects (Hair et al., 2022). In total, 530 questionnaires were disseminated, yielding 395 returned responses (response rate = 74.5%). After screening for missing values and inclusion-criteria violations, 380 responses were retained, producing a valid response rate of 71.7%, which

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exceeds recommended thresholds for management research (Mellahi & Harris, 2016). To establish content validity, the instrument was reviewed by five subject-matter experts, three academics with expertise in HRM and sustainability and two senior HR practitioners—who evaluated item wording, contextual relevance, and construct alignment. Their feedback was incorporated into a revised version of the instrument, which was subsequently pilot tested with 50 faculty respondents. All Cronbach's alpha values exceeded the recommended threshold of 0.70 (Nunnally & Bernstein, 1994), confirming adequate internal consistency and supporting the suitability of the instrument for full-scale data collection.

3.2 Measures

All constructs were measured using validated scales adapted from prior research, with items rated on a five-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree). GHRM was measured using a six-item scale adapted from Dumont et al. (2017) and Fawehinmi et al. (2020), capturing green training, green performance management, and green rewards. GOC was measured using a ten-item scale adapted from Harris and Crane (2002) and Afum et al. (2020), capturing shared environmental values, norms, and symbolic practices. SA was measured using a five-item scale adapted from Blok et al. (2015) and Opatha and Kottawatta (2020), capturing cognitive, affective, and normative evaluations of environmental responsibility. ESB was measured using a ten-item scale adapted from Blok et al. (2015).

3.3 Demographics

The sample comprised 380 faculty members, with a near-equal gender split between male (51.6%) and female (48.4%) respondents. Assistant Professors represented the largest proportion by academic rank (38.4%), followed by Lecturers (28.4%), Associate Professors (21.6%), and Professors (11.6%), suggesting adequate representation across the academic hierarchy. The 30–39 age group accounted for the largest share of respondents (45.0%), consistent with the demographic profile of faculty in Pakistani universities, where a significant proportion of the academic workforce is in the early-to-mid-career stage. Nearly three-quarters of respondents held a PhD qualification (74.5%), reflecting the increasing emphasis on doctoral credentials within Pakistani HEIs. With respect to tenure, the majority of respondents had between two and five years of organizational experience (41.3%), and over a third reported tenures exceeding five years, indicating that most participants had sufficient exposure to their institutional environment to meaningfully respond to items related to organizational practices and culture.

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Table 1. Demographic Characteristics of Respondents

Variable	Category	Frequency	Percentage (%)
Gender	Male	196	51.6
	Female	184	48.4
Academic Rank	Lecturer	108	28.4
	Assistant Professor	146	38.4
	Associate Professor	82	21.6
	Professor	44	11.6
Age Group	20–29 years	53	13.9
	30–39 years	171	45.0
	40–49 years	118	31.1
	50 years and above	38	10.0
Highest Qualification	MPhil	97	25.5
	PhD	283	74.5
Tenure	1–2 years	84	22.1
	2–5 years	157	41.3
	6–10 years	79	20.8
	More than 10 years	60	15.8

Note. N = 380.

3.4 Data Analysis Technique

The hypothesized model was tested using partial least squares structural equation modeling (PLS-SEM) in SmartPLS 4.0. PLS-SEM was selected instead of covariance-based SEM for three reasons. First, it is particularly suitable for analyzing models with complex relationships, multiple constructs, and a combination of direct and indirect paths (Hair et al., 2022). Second, it is robust to deviations from normality, which are typical in Likert-scale data. Third, unlike covariance-based SEM, which focuses on theory confirmation, PLS-SEM emphasizes prediction and variance explanation, which aligns with the present study's objective of evaluating the explanatory power and practical relevance of the proposed model (Rigdon et al., 2017). Consistent with the two-step approach recommended by Hair et al. (2022), the measurement model was assessed for reliability and validity before testing the structural model and hypothesized relationships. Bootstrapping with

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5,000 subsamples was used to estimate path coefficients and confidence intervals. Prior to analysis, data were screened for missing values, multicollinearity, and common method bias. Variance inflation factor values ranged from 1.253 to 1.850, well below the recommended threshold of 5 (Hair et al., 2022), indicating no multicollinearity concern. Common method bias was assessed using Harman's single-factor test; the first factor accounted for 31.8% of the total variance, below the 50% threshold, suggesting that common method bias was not a significant issue (Podsakoff et al., 2003).

4. Results

4.1 Measurement Model

The measurement model was evaluated to assess reliability and validity, following established PLS-SEM guidelines (Hair et al., 2022). All constructs were specified as reflective. The coefficient of determination (R^2) for ESB is 0.529, indicating that GHRM, GOC, and SA jointly explain 52.9% of the variance in ESB, which falls within the moderate-to-substantial range for applied organizational research. The R^2 for SA is 0.202, indicating that GHRM and GOC jointly explain 20.2% of the variance in SA, which represents a modest but acceptable level of explanation, consistent with attitudinal constructs that are shaped by multiple individual, social, and contextual factors beyond organizational antecedents alone (Hair et al., 2022). Internal consistency reliability and convergent validity results are reported in Table 2. All constructs exhibit Cronbach's alpha and composite reliability values exceeding 0.70, and average variance extracted (AVE) values above 0.50, satisfying reliability and convergent validity thresholds (Hair et al., 2022). Outer loadings for retained items were generally strong, with most exceeding 0.70, supporting indicator reliability. Indicators (GHRM3, ESB4, GOC8, SA5) showed loadings between 0.625 and 0.682, which were retained because their removal did not improve AVE or CR, and they fall within the acceptable range of 0.40–0.70 (Hair et al., 2022). Moreover, in total 6 items were eliminated post pilot, specifically ESB items (ESB3, ESB5, ESB10) and GOC items (GOC4, GOC5, GOC10) were removed because their outer loadings fell below 0.40 and their retention compromised the AVE of their respective constructs (Hair et al., 2022). The remaining items were retained for hypothesis testing.

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Figure 2. Measurement Model

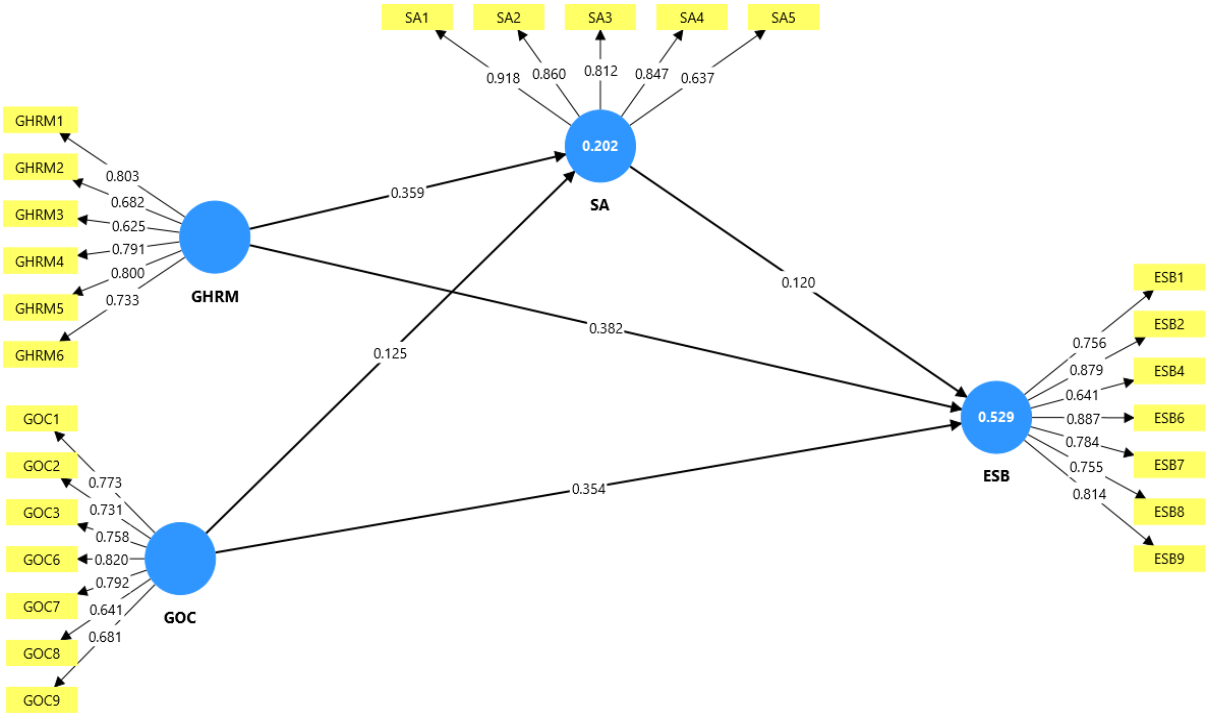

Table 2. Construct Reliability and Convergent Validity

Construct	Item	Outer Loading	CA	CR	AVE
ESB	ESB1	0.756	0.900	0.925	0.627
	ESB2	0.879			
	ESB4	0.641			
	ESB6	0.887			
	ESB7	0.784			
	ESB8	0.755			
	ESB9	0.814			
GHRM	GHRM1	0.803	0.836	0.851	0.551
	GHRM2	0.682			
	GHRM3	0.625			

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	GHRM4	0.791			
	GHRM5	0.800			
	GHRM6	0.733			
GOC	GOC1	0.773	0.868	0.889	0.554
	GOC2	0.731			
	GOC3	0.758			
	GOC6	0.820			
	GOC7	0.792			
	GOC8	0.641			
	GOC9	0.681			
SA	SA1	0.918	0.874	0.879	0.672
	SA2	0.860			
	SA3	0.812			
	SA4	0.847			
	SA5	0.637			

Note. CA = Cronbach's Alpha; CR = Composite Reliability; AVE = Average Variance Extracted.

Discriminant validity was assessed using the Fornell-Larcker criterion and the heterotrait-monotrait (HTMT) ratio. As shown in Tables 3 and 4, the square roots of AVE for each construct exceeded their inter-construct correlations, satisfying the Fornell-Larcker criterion. All HTMT values were below the conservative threshold of 0.85, confirming adequate discriminant validity (Henseler et al., 2015).

Table 3. Heterotrait-Monotrait Ratio (HTMT)

	ESB	GHRM	GOC	SA
ESB	—			
GHRM	0.722	—		
GOC	0.673	0.703	—	
SA	0.444	0.511	0.379	—

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Table 4. Fornell-Larcker Criterion

	ESB	GHRM	GOC	SA
ESB	0.792			
GHRM	0.661	0.742		
GOC	0.640	0.638	0.744	
SA	0.416	0.439	0.354	0.820

Note. Diagonal values are the square roots of AVE; off-diagonal values are inter-construct correlations.

4.2 Structural Model and Hypothesis Testing

The structural model was tested using bootstrapping with 5,000 subsamples (Hair et al., 2022). Table 5 reports the path coefficients, standard deviations, t-values, p-values, and bias-corrected confidence intervals. The direct effects indicate that GHRM has a significant and positive effect on ESB ($\beta = 0.382$, $t = 8.51$, $p < 0.001$), supporting H1. GOC also positively influences ESB ($\beta = 0.354$, $t = 8.54$, $p < 0.001$), supporting H2. SA significantly predicts ESB ($\beta = 0.120$, $t = 3.05$, $p = 0.001$), supporting H3. All bias-corrected confidence intervals excluded zero, confirming statistical significance. The mediation analyses show that SA significantly mediates the relationship between GHRM and ESB ($\beta = 0.043$, $t = 2.61$, $p = 0.004$; 95% BC CI [0.020, 0.074]), supporting H4. SA also significantly mediates the relationship between GOC and ESB ($\beta = 0.015$, $t = 2.05$, $p = 0.020$; 95% BC CI [0.005, 0.030]), supporting H5. Because both the direct effects (GHRM → ESB and GOC → ESB) and the indirect effects through SA are significant and positive, the results indicate complementary mediation in both pathways (Zhao et al., 2010; Hair et al., 2022). Notably, the indirect effect through SA is much larger for GHRM (0.043) than for GOC (0.015), suggesting that GHRM shapes faculty members' SA more strongly than GOC does. This is consistent with theoretical expectations: GHRM influences SA directly through structured practices such as training, appraisal, and rewards, whereas GOC works more gradually through shared norms and cultural cues.

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Figure 3. Structural Model

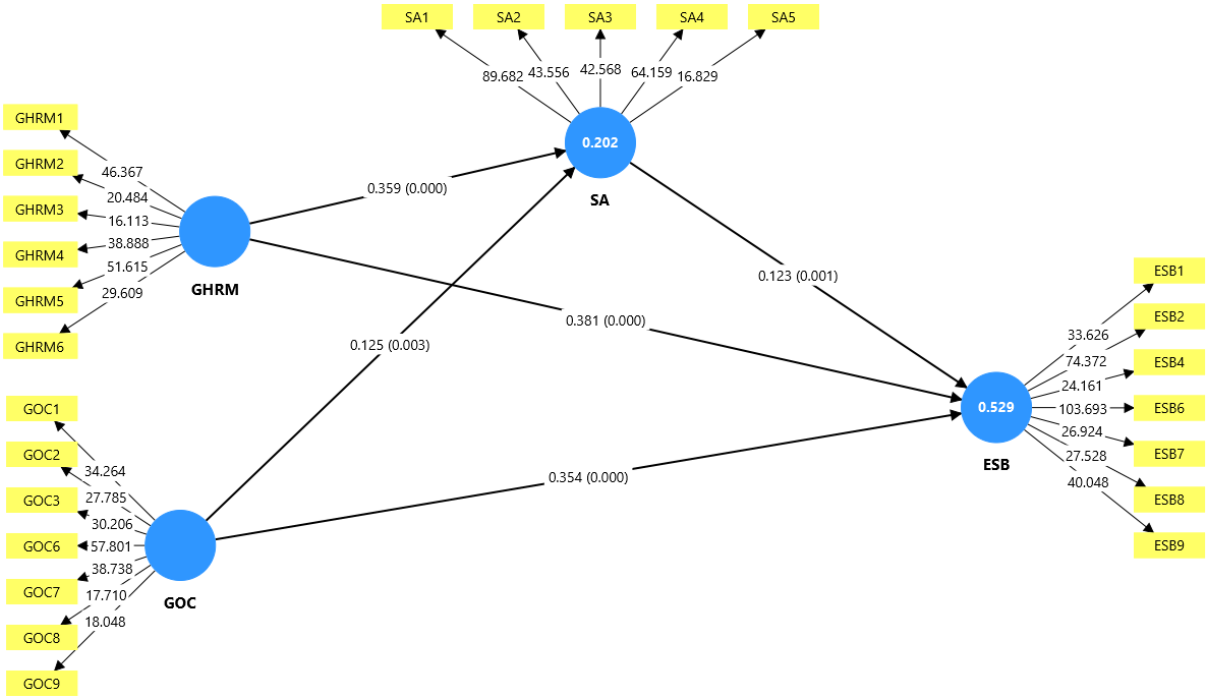

Table 5. Results of Hypothesis Testing

Hypothesis	Path	β	SD	t-value	p-value	5% CI	95% CI	Decision
H1	GHRM → ESB	0.382	0.045	8.51	0.000	0.306	0.454	Supported
H2	GOC → ESB	0.354	0.041	8.54	0.000	0.283	0.418	Supported
H3	SA → ESB	0.120	0.039	3.05	0.001	0.058	0.188	Supported
H4	GHRM → SA → ESB	0.043	0.017	2.61	0.004	0.020	0.074	Supported
H5	GOC → SA → ESB	0.015	0.007	2.05	0.020	0.005	0.030	Supported

Note. Bootstrapping with 5,000 subsamples; bias-corrected confidence intervals.

4.3 Predictive Relevance and Effect Sizes

Predictive relevance was assessed using the PLSpredict procedure with 10 folds and 10 repetitions (Shmueli et al., 2019; Hair et al., 2022). Unlike blindfolding-based Q^2, PLSpredict evaluates out-

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of-sample predictive performance by comparing predicted and observed values, providing a stricter test of a model's predictive capability. Following Shmueli et al. (2019), Q^2predict values greater than zero indicate that the model holds predictive relevance for the endogenous construct. As reported in Table 6, the Q^2predict values for both endogenous constructs exceeded zero (ESB = 0.487; SA = 0.191), confirming that the model possesses out-of-sample predictive relevance. Effect sizes (f^2) were examined to assess the contribution of each predictor to the endogenous constructs (Cohen, 1988; Hair et al., 2022). As shown in Table 7, GHRM (f^2 = 0.167) and GOC (f^2 = 0.156) exert medium effects on ESB, while SA (f^2 = 0.026) exerts a small but meaningful effect. For SA, GHRM (f^2 = 0.096) shows a small effect, whereas GOC (f^2 = 0.012) falls below the conventional small-effect threshold. However, this should not be interpreted as diminishing the theoretical relevance of GOC. Consistent with SIP theory (Salancik & Pfeffer, 1978), GOC is more likely to influence ESB through the internalization of shared environmental norms and the reinforcement of context-specific behavioral cues, rather than through immediate shifts in individual attitudes. The relatively strong direct effect of GOC on ESB (β = 0.354) supports this interpretation, suggesting that GOC operates as a parallel cultural mechanism alongside the attitudinal pathway captured by SA.

Table 6. Predictive Relevance (Q^2predict)

Construct	Q^2predict	RMSE	MAE
ESB	0.487	0.720	0.567
SA	0.191	0.905	0.747

Note. Q^2predict values greater than zero indicate predictive relevance. PLSpredict was run with 10 folds and 10 repetitions.

Table 7. Effect Sizes (f^2)

Path	f^2 value	Interpretation
GHRM → ESB	0.167	Medium
GOC → ESB	0.156	Medium
SA → ESB	0.026	Small
GHRM → SA	0.096	Small
GOC → SA	0.012	Below small threshold

Note. Following Cohen (1988): f^2 values of 0.02, 0.15, and 0.35 indicate small, medium, and large effects, respectively.

4.4 Discussion

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HEIs are progressively expected to function not only as knowledge producers but also as role models for achieving the SDGs (Aboramadan, 2022; Berchin et al., 2021). However, the mechanisms through which universities translate sustainability intentions into consistent ESB remain insufficiently explored, particularly in the context of developing countries. Addressing this gap, the present study examined how GHRM and GOC shape ESB in universities in Pakistan, with SA as a mediating mechanism. Integrating AMO and SIP theories, the findings offer integrated insights into the interplay among structured organizational initiatives, culture, and psychological mechanisms in promoting ESB among faculty members in HEIs. The findings show that GHRM plays a substantial role in shaping ESB, underscoring the importance of green HR systems as institutional mechanisms through which sustainability is enacted in everyday work practices. Consistent with prior research, GHRM practices such as green training, performance appraisal, and reward systems equip employees with the skills, motivation, and reinforcement needed to engage in green behavior (Renwick et al., 2013; Dumont et al., 2017). Recent studies further support this view: Imtiaz and Iqbal (2024) report that GHRM strengthens faculty engagement in environmental practices within Pakistani HEIs, while Yong et al. (2020) highlight that aligning HR processes with environmental responsibility creates conditions that encourage consistent ESB. From an AMO perspective, GHRM operates as an enabling mechanism that translates sustainability intentions into ESB, a role that is particularly salient in HEIs where formal control mechanisms are limited.

Similarly, GOC was found to have a strong positive effect on ESB, highlighting the importance of shared norms and values in shaping faculty environmental conduct. Prior empirical evidence strongly supports this relationship. Studies in South Asian and comparable contexts show that cultures emphasizing environmental responsibility foster stronger green behaviors by embedding sustainability into shared norms and everyday practices (Abbas & Dogan, 2022; Habib et al., 2026). Research further suggests that green culture creates a supportive environment in which sustainability-related behaviors are legitimized and reinforced (Mirahsani et al., 2024; Yu & Li, 2025). SIP theory explains this relationship by conceptualizing GOC as a salient social cue that informs faculty members about which behaviors are valued and expected within the institution (Salancik & Pfeffer, 1978). Given the high level of academic autonomy in universities, these cultural signals play a central role in shaping and sustaining faculty engagement in ESB. Beyond direct effects, the most theoretically significant finding of this study concerns the mediating role of SA in linking both GHRM and GOC to ESB. The results indicate that SA functions as a critical psychological conduit through which organizational sustainability signals are interpreted, internalized, and translated into discretionary green behavior. This finding aligns with prior work demonstrating that organizational sustainability initiatives rarely produce direct behavioral effects; rather, their influence operates through employees' attitudinal evaluations of environmental priorities (Bhutto et al., 2021; Luu, 2024). The significance of SA in this study extends this line of research in two important ways. First, while prior work has typically employed unidimensional

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attitudinal proxies such as environmental concern (Fawehinmi et al., 2020), green commitment (Aboramadan & Karatepe, 2021), or environmental passion (Yuan et al., 2024), the present study captures SA as a multidimensional construct integrating cognitive, affective, and normative orientations toward sustainability (Milfont & Duckitt, 2010). Second, by examining SA's mediating role in HEIs, where compliance-based monitoring is limited and faculty discretion is high, this study demonstrates that the attitudinal pathway becomes especially decisive for sustaining ESB in autonomy-driven professional environments (Anwar et al., 2020; Farooq et al., 2024).

The complementary mediation pattern observed for both GHRM and GOC indicates that SA partially carries the influence of these organizational antecedents on ESB, suggesting that structural, cultural, and attitudinal pathways operate together rather than in isolation. Notably, the indirect effect through SA was stronger for GHRM than for GOC, reflecting the different ways these antecedents reach faculty members' attitudinal evaluations. From an AMO perspective, GHRM works through deliberate practices such as green training, performance appraisal, and participation in sustainability initiatives that build employees' environmental knowledge, motivation, and sense of responsibility, the very components that make up SA (Opatha & Kottawatta, 2020; Fawehinmi et al., 2024). GOC, by contrast, exerts its influence less directly. Drawing on SIP theory, green culture shapes SA gradually, through repeated exposure to shared environmental norms, peer behavior, and symbolic practices that signal what is collectively valued (Salancik & Pfeffer, 1978; Mirahsani et al., 2024). This asymmetry suggests that while both antecedents matter, GHRM offers a more direct route to attitudinal internalization, whereas GOC provides the wider cultural foundation that supports and sustains SA over time. Together, these findings highlight SA as the central psychological mechanism through which organizational sustainability signals are translated into the kind of voluntary, consistent green behavior that characterizes ESB in HEIs.

This study offers clear guidance for HEIs seeking to strengthen their contribution to sustainability and progress toward the SDGs. The findings show that universities cannot rely solely on environmental policies or isolated green initiatives to achieve sustainable outcomes. Instead, faculty ESB emerges from the combined influence of structured GHRM practices, a supportive GOC, and the psychological internalization of sustainability through SA. GHRM embeds sustainability into everyday academic roles, while GOC normalizes pro-environmental behavior through shared values and expectations. SA further shapes how these mechanisms are enacted by providing the psychological readiness through which organizational signals are translated into consistent behavioral engagement. Overall, the results indicate that sustainability depends on the alignment of systems, norms, and psychological mechanisms rather than single interventions, enabling universities to move beyond symbolic efforts and embed ESB institutionally.

5. Conclusion, Implications, Limitations, and Future Research Directions

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This study examined how green human resource management and green organizational culture shape employee sustainable behavior among faculty members in Pakistani higher education institutions, with sustainable attitude serving as the mediating psychological mechanism. Grounded in AMO and SIP theories, the findings confirm that both GHRM and GOC are meaningful organizational levers for promoting ESB, and that sustainable attitude functions as the critical psychological conduit through which these organizational signals are translated into discretionary green behavior. The stronger indirect effect of GHRM relative to GOC through sustainable attitude further underscores that structured HR practices offer a more direct route to attitudinal internalization, while organizational culture provides the broader normative foundation that sustains behavioral engagement over time. Taken together, the results demonstrate that faculty ESB is not the product of any single organizational intervention but emerges from the aligned interaction of systems, culture, and individual psychological orientations. Universities that embed sustainability into HR processes, reinforce it through shared cultural norms, and cultivate positive sustainability attitudes among faculty are better positioned to translate institutional sustainability commitments into consistent behavioral outcomes. Given the unique role of faculty as both practitioners and transmitters of sustainability values to students and society, these findings carry implications that extend well beyond institutional boundaries. Future research should build on this framework by incorporating longitudinal designs, multi-source data, and additional boundary conditions to deepen understanding of how sustainable behavior is fostered and sustained in academic and other professional contexts.

5.1 Theoretical Implications

Research on sustainability in HEIs has largely concentrated on institutional strategies, policies, and governance arrangements, with comparatively limited attention to how sustainability is implemented through employee behavior, particularly in HEIs in developing countries (Hinduja et al., 2023; Ferrer-Estévez & Chalmeta, 2021). This study advances the sustainability and organizational behavior literature by examining how GHRM and GOC jointly shape ESB among faculty members in universities in Pakistan, with SA as a psychological mediating mechanism. While prior research has examined green HR practices and organizational culture in isolation (Abbas & Dogan, 2022), limited empirical work has integrated these mechanisms within a single employee-level framework with the mediation of SA. Moreover, existing research has not combined AMO and SIP theory to explain ESB with SA as a mediator, limiting theoretical understanding of how organizational initiatives, social cues, and psychological mechanisms operate together in academia. By introducing SA as the mediating mechanism, this study moves beyond surface-level associations between organizational practices and ESB, demonstrating that the translation of green HR systems and cultural signals into behavioral outcomes is substantially conditioned by employees' internalized sustainability orientations. This attitudinal mediation perspective enriches theoretical understanding of ESB as a psychologically embedded

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phenomenon shaped by the interaction between organizational structures and individual evaluative frameworks.

5.2 Practical Implications

The findings offer actionable guidance for HEIs seeking to strengthen sustainability outcomes through faculty behavior rather than relying solely on symbolic initiatives. The results suggest that sustainability efforts in HEIs are most effective when GHRM, GOC, and SA are aligned. Universities should therefore move beyond isolated sustainability programs and embed environmental priorities into core HR functions, including faculty development, performance evaluation, and recognition systems. By systematically integrating sustainability into these processes, universities signal that environmental responsibility is institutionally legitimate, thereby building faculty members' environmental competencies and motivating sustained behavioral engagement. The study also highlights the importance of cultivating a strong GOC, particularly in academic environments characterized by high professional autonomy. Universities can reinforce such cultures by consistently integrating sustainability into teaching norms, research expectations, and campus routines, rather than treating it as an administrative add-on. At the same time, the mediating role of SA indicates that universities should invest in programs specifically designed to cultivate positive sustainability orientations among faculty members. Awareness campaigns, environmental workshops, exposure to sustainability research, and involvement in campus green initiatives can strengthen cognitive evaluations, affective concern, and normative responsibility toward sustainability. When GHRM and GOC are complemented by direct attitudinal interventions, the cumulative effect on ESB is expected to be substantially stronger. Importantly, faculty members occupy a pivotal position in universities, as their behaviors extend beyond internal operations and influence students through role modeling, curriculum design, and everyday interaction. Embedding sustainability into faculty practices therefore creates a spillover effect, shaping student attitudes and behaviors and amplifying the university's broader contribution to national and global sustainability goals. Universities seeking to advance the SDGs should thus view faculty engagement not merely as an internal management issue, but as a strategic lever for broader societal impact.

5.3 Limitations and Future Research Directions

Despite its contributions, this study has several limitations that offer directions for future research. First, the cross-sectional design limits the ability to draw causal inferences about the relationships among GHRM, GOC, SA, and ESB. Longitudinal or experimental designs would allow future studies to examine how sustainability-related behaviors evolve over time and how organizational and attitudinal mechanisms interact dynamically. Second, the study relies on self-reported data collected from faculty members in Pakistani HEIs, which may raise concerns regarding perceptual bias and contextual generalizability. Although procedural remedies were applied to reduce common method bias, future research could incorporate multi-source data, such as peer

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evaluations, administrative records, or student perceptions, to strengthen robustness. Comparative studies across countries or institutional systems would also help assess the transferability of the findings to other higher education contexts. Finally, the study focuses on a limited set of organizational mechanisms and a single mediating variable. Future research could extend this framework by examining additional mediating mechanisms, such as green psychological climate, environmental self-efficacy, or green organizational identity. Exploring boundary conditions such as institutional size, university type, faculty tenure, and individual environmental values as moderators would further enrich the theoretical model and provide more nuanced practical guidance.

Declarations

Funding: This research received no external funding.

Ethics approval and consent to participate: This study did not involve clinical or experimental procedures. Prior to data collection, participants were informed about the purpose of the study, the voluntary nature of their participation, and their right to withdraw at any time. Informed consent was obtained from all participants. Anonymity and confidentiality were maintained throughout the research process, in line with institutional and national research ethics guidelines.

Consent for publication: Not applicable.

Conflict of interest: The authors declare no conflict of interest.

Data availability: Data are available from the corresponding author upon reasonable request.

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