

Green Humble Leadership and Green Creativity: The Parallel Mediating Roles of Green Psychological Capital and Green Autonomy in Pakistan's Hospitality

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ABSTRACT

Purpose - The aim of this study was to investigate whether Green Humble Leadership (GHL) is related to employee Green Creativity (GC) and whether the relationship between them can be explained by parallel mediations of Green Psychological Capital (GPC) and Green Autonomy (GA). Based on Self-Determination Theory, the study examines how humility related to sustainability can boost the green psychological assets and perceived discretion of employees to act out their environmental ideas by collecting data from 286 frontline employees in hotels in Swat, Madyan, and Bahrain, Pakistan, and analyzed using SmartPLS 4. Results show that GHL has a significant positive direct association with GC ($\beta = 0.237$, $p < 0.001$). GPC (indirect effect = 0.035, $p = 0.039$) and GA (indirect effect = 0.062, $p = 0.003$) both significantly mediate this relationship, with GA showing a stronger indirect pathway. The model explains 21.6% of the variance in GC. Based on the results, it is recommended that hospitality companies which aim to make their employees more creative for the environment consider applying the following leadership practices: recognition of employees' environmental knowledge, encouraging employees' involvement in environmental issues-related problem solving and giving some space for employees to try and experiment the green practices. The study doesnot focus on psychological resources or autonomy as individual factors but rather sees them as complementary channels connecting sustainability-oriented humble leadership and employee green creativity. Furthermore, the study contributes by integrating two green-specific mechanisms within a parallel mediation model and by extending evidence on sustainable leadership in Pakistan's hospitality industry.

Keywords: Green Humble Leadership; Green Creativity; Green Psychological Capital; Green Autonomy; Hospitality Sustainability; Self-Determination Theory

1.INTRODUCTION

The current conundrum for the hospitality sector is that it creates significant economic and social value while still being resource-intensive and having an impact on the environment (Mora-Contreras et al., 2025). Hotels and other tourism-related activities use energy, water and produce waste and emissions in the areas of accommodation, food service, mobility, and other daily activities (Agarwal et al., 2024; Mahran et al., 2025). Meanwhile, sustainability is not merely an add-on, but a part of the core of the business, where eco-responsible products and services are expected by guests and a competitive advantage is sought by hotels through credible and responsible actions (Rubel et al., 2025; Bilal

& Adil, 2024; De Oliveira Lima et al., 2024). Such pressures cannot be met through environmental policies and compliance procedures. Hotels must also have staff who recognize how to find new and sustainable solutions to environmental impacts, and ways to deliver sustainable services (Vu et al., 2025). In this regard, Green Creativity (GC) the generation of novel and useful ideas related to green products, services, processes and practices (Chen & Chang, 2013) and is a key employee-level capability to drive sustainability initiatives from a vision to action (Li et al., 2026; Meirun et al., 2024). The main issue is that formal sustainability commitments do not inherently foster conditions of leadership that motivate frontline employees to question routines, to share environmental

ideas, and to try new solutions.

Leadership is therefore an important piece of the puzzle, as frontline workers seldom initiate and adopt environmental changes by themselves (Asfahani, 2025). Leadership with mainly authoritarian and control dimension can ensure consistency in routine service delivery, but creative responses to environmental problems require a social environment where employees can share their knowledge and voice, question the way things are done, and take interpersonal and operational risks (Liu et al., 2024). Humble leadership is relevant because it reflects a recognition of the limitations of leaders, an appreciation of the contributions of followers, and a willingness to learn and for leaders to be open to new ideas (Owens et al., 2013). If such behaviors are applied to address environmental issues, then Green Humble Leadership (GHL) is a leadership perspective focused on sustainability that incorporates the involvement of employees in problem-solving regarding environmental issues and the importance of frontline knowledge (Shah et al., 2026; Durrani et al., 2025). The latest studies on hospitality also show that psychological and motivational mechanisms can drive the stimulation of creativity and innovative actions within the field of sustainability (Meirun et al., 2024). The question is not only what leaders say about green goals, but how they act to make it possible for staff to translate knowledge into innovative action.

The present study will combine four closely related constructs based on this problem-solution logic. GHL is an independent variable and reflects humility toward environmental issues such as openness to employee ideas and recognition of a lack of knowledge about the environment for leaders. GC is the dependent variable that captures the generation and advocacy of novel solutions to environmental problems by the employees (Chen & Chang, 2013). Green Psychological Capital (GPC) and Green Autonomy (GA) are explored as parallel mediation. GPC can be defined as one's positive psychological resources in the green domain, including environmental self-efficacy, optimism, hope, and resilience (Chen & Yan, 2022; Luthans et al., 2015). GA is defined as a perceived freedom and discretion of employees to start, raise questions, experiment with and decide about green practices (Maitlo et al., 2022). In this regard, the study has three research questions RQ1: Is there a positive relationship between GHL and employee GC? RQ2, does GPC transmit the relationship between GHL and GC? RQ3, does GA transmit the relationship between GHL and GC? Because the study is based on these questions, the analysis extends beyond an association of leadership and outcome to the psychological and motivational processes that could link sustainability-oriented leadership to employee creativity.

The research questions span a gap that exists in literature with regards to leadership styles, mechanisms and contexts. Past hospitality research has examined the impact of empowerment or transformational leadership on green creativity in hospitality organizations, finding that environmentally specific leadership concepts are associated with green creativity via other mechanisms, including green creative self-efficacy, green learning orientation, green work engagement, and processes

related to green work engagement (Meirun et al., 2024). Green inclusive leadership studies have indicated that the satisfaction of basic psychological needs is associated with green innovative behavior among hotel employees (Zhao et al., 2024). The concept of green autonomy has also been linked to green creativity, and primarily not within the current leadership structure (Maitlo et al., 2022). In the Swat hospitality context, recent studies have focused on green work engagement and perceived organizational support (POS) as factors influencing GHL and GC (Shah et al., 2026). It is unclear whether there are unique and simultaneous pathways through which green-specific psychological resources and green autonomy are related to GHL and GC. Theoretically this omission is consequential, for the psychological ability to persevere when things are not clear and the necessary discretion to try out things and make decisions about them is needed in environmental creativity. These processes are very well described in the literature of Self-Determination Theory (SDT) that explains how need-supportive social environments can promote autonomy, competence, and relatedness and thus support motivated and effective functioning (Ryan & Deci, 2000; Deci et al., 2017).

The novelty of the present study is not that the GHL, GC, GPC and GA constructs were newly developed by this study, but that they have been innovatively theorized and empirically integrated. For the first time the study integrates GHL with two green-specific mechanisms, one psychological resource based (GPC) and another discretion-based (GA) and explains the process of employee GC by means of one parallel mediation model. This matters because psychological capacity and opportunity to act are not synonymous: employees might have psychological capacity (confidence, optimism, hope, resilience) but not the opportunity to act (discretion) when work systems do not allow discretion; and, discretion can be of limited value when employees lack the psychological resources to keep going in the face of uncertainty and setbacks. This design is theoretically and empirically different from the authors' accompanying study of the GHL–GC relationship, which proposed green work engagement as a single mediator and perceived organizational support as a moderator in between the two variables (Shah et al., 2026), using a sample of hotel workers surveyed in the summer tourist season with covariance-based SEM. The present study, however, is based on an independent sample of frontline workers from a different group of hotels during the winter season (January 2026), adopts a parallel two-mediator model based on Self-Determination Theory (SDT) instead of Social Exchange and Conservation of Resources Theory, and applies variance-based PLS-SEM to test the model. A theoretically useful setting is Pakistan because the hospitality industry is growing under the constraints of limited resources, evolving sustainability initiatives, and ecologically conscious tourists, while frontline employees have firsthand experience of the daily challenges faced in the provision of services and operations (Munir et al., 2025; Bilal & Adil, 2024). Therefore, the question of whether there is a relationship between humility-based leadership and sustainability-specific leadership in an underrepresented hospitality context in which psychological resources and perceived autonomy can be

mobilized for green creativity among the frontline staff of the tourist destinations of Swat, Madyan and Bahrain can be examined.

2.THEORETICAL FRAMEWORK AND HYPOTHESIS DEVELOPMENT

2.1 Green Humble Leadership

Owens et al. (2013) defined humble leadership as the ability to self-aware of their own strengths and weaknesses, appreciative of others' strengths and contributions, and open to learning and new ideas. Green Humble Leadership (GHL) is a set of leadership behaviors adapted specifically to the context of environmental problems, where the leader recognizes his/her own lack of knowledge about the environment, is eager to receive employee ideas for the environment, values their actions for sustainability, and is open to learning from what colleagues learn on the ground (Shah et al., 2026; Durrani et al., 2025). It is important to distinguish GHL from generic humble leadership, as the basis of humility is clearly problem solving of environmental issues and sustainability-related work. It is of importance in hotel operations because workers are exposed to environmental problems during their routine services, and they might be familiar with some practical knowledge that managers are not aware of (Vu et al., 2025). GHL normalizes that knowledge and decreases the focus on the skill set of the leader and establishes a relational environment where employees can share their ideas on sustainable practice and critique ineffective routines.

Some theories have supported the effectiveness of humble leadership. According to Social Learning Theory, employee behaviors replicate leaders' behaviors, and leader behaviors which contain humility in talking about environmental knowledge induce lower risk of criticism for employees and make them feel they can share their ideas freely (Alsetoohy et al., 2022). Drawing on SIT to suggest that by meeting the needs of employees for autonomy, competence, and relatedness, humble leadership can enhance intrinsic motivation and creativity within the workforce (Liu et al., 2024). Employees feel safe to take interpersonal risks for creative expression when they are in a psychological safe environment, where humble leadership promotes such a sense (Mrayyan & Al-Rjoub, 2024). GHL is especially relevant to the hospitality industry, as the frontline staff are responsible for making decisions that involve discretion and creativity to respond to various guest needs and operational problems. Sustainable innovation requires the support of leaders who accept their own limits, value their employees' contributions and incorporate local knowledge on the ground (Meirun et al., 2024).

2.2 Green Creativity

Green Creativity (GC) is defined as the generation, promotion and development of novel and useful ideas related to the environmental products, services, processes and practices (Chen & Chang, 2013). The construct is not the same as general creativity since the usefulness and novelty of ideas are targeted towards environmental improvement. In the hospitality industry, GC can manifest implementing new strategies to minimize energy or water usage, overhauling waste management, enhancing

sustainable food selections or implementing sustainable guest services (Li et al., 2026; Meirun et al., 2024). In the present study, therefore, GC is considered as a sustainability outcome, at the employee level, which reflects the ability to go beyond compliance with novel environmental solutions. This separation is key to the proposed model as the research focuses on the question of whether GHL establishes conditions in which front-line staff are not simply enacting green procedures but also developing and promoting new strategies to solving environmental problems.

2.3 Green Psychological Capital

Green Psychological Capital (GPC) is a specialization of psychological capital, which is applied to environment-related activities. General psychological capital is a positive psychological resource that involves self-efficacy, optimism, hope and resilience (Luthans et al., 2015). In the green domain, these resources relate to workers' self-confidence in carrying out environmental work, positive expectations about the benefits of sustainability, sustainable work process pathways to environmental goals, and resilience in the face of failures in green activities (Chen & Yan, 2022). Theoretically speaking, GPC has relevance to green creativity since environmental innovation can be uncertain and may fail in trials, resist the operations or even fail to deliver benefits for a long time. Individuals with higher green psychological resources can, therefore, be more likely to continue with environmental problem solving instead of giving up on their creative efforts when ideas are blocked or stalled. For this study, GPC refers to the psychological-resource process that may mediate the relationship between GHL and GC.

2.4 Green Autonomy

Green autonomy (GA) is the extent to which employees feel they can freely and discretely start to ask questions, experiment with and decide upon environmentally relevant practices (Maitlo et al., 2022). GPC reflects the psychological assets that employees have, while GA reflects the degree of freedom employees have to use their assets in the green domain as they see fit in the workplace. The distinction is significant in the context of creativity, as an employee may have the confidence and persistence to foster an idea about the environment, but may find that the approval requirements are too high to implement and/or test the idea. In line with the Self-Determination Theory, autonomy is a fundamental psychological need and has been linked to volitional functioning, intrinsic motivation and creative involvement (Deci et al., 2017; Ryan & Deci, 2000). In this study, GA is therefore used as the motivational and opportunity pathway between GHL and GC.

2.5 Self-Determination Theory as Theoretical Foundation

The study is based on Self-Determination Theory (SDT), which provides the general framework to understand how the relationship between GHL and GC via GPC and GA might be explained. According to SDT, satisfaction of the basic psychological needs for autonomy, competence, and relatedness leads to more effective functioning and self-

endorsed motivation (Deci et al., 2017; Ryan & Deci, 2000). Therefore, this need-supportive logic is supported by leaders who encourage the participation of their employees can help to strengthen experienced autonomy, leaders who acknowledge the importance of employees' environmental contributions can help to strengthen competence, and leaders who engage employees in an open and respectful manner can help to strengthen relatedness. In the current research model, two discernible effects of these need-positive factors are hypothesized: the activation of green psychological resources (GPC), and an increase in feelings of discretion to act in relation to environmental issues (GA). Both processes can then foster GC, as creative environmental problem solving also calls for persistence and a degree of freedom to explore alternatives to the status quo and implement them. In this context SDT offers a solid ground for discussing GPC and GA as two complementary mechanisms instead of equivalent mediators.

2.6 Green Humble Leadership and Green Creativity

GHL is anticipated to catalyze green creativity in multiple synergistic ways. Humble leaders recognize and solicit staff ideas, creating the psychological space for staff to voice new environmental solutions (Mrayyan & Al-Rjoub, 2024). Similarly, these leaders exhibit openness to learning and new ideas, fostering employees to think innovatively when solving problems and commitment to sustainability by involving employees in creating more sustainable operations (Durrani et al., 2025; Liu et al., 2024). Empirical studies indicate that humble leaders are related to positive outcomes in creativity within a variety of contexts, such as leader humility boosting creative performance via increased intrinsic motivation and work engagement (Liu et al., 2024); better team and individual performance outcomes (Owens et al., 2013); and better voluntary green behaviors and environmental performance in the hotel industry in the context of sustainability (Alsetoohy et al., 2022). The service-oriented nature of the hospitality sector means that many employees are required to make decisions and get creative to solve issues in the environment as they occur. GHL is especially applicable in this context: If the leaders are forthcoming in addressing sustainability issues, employees are more likely to suggest new environmental solutions.

H1: GHL has a positive direct relationship with GC.

2.7 The Mediating Role of Green Psychological Capital

Based on SDT, Psychological mechanisms can be used to hypothesize a positive correlation between GHL and GC through the mediation of GPC. In the first, GHL is likely enhancing green self-efficacy by the leaders' awareness of their limitations and sincere affirmation of the employee's contribution, which leads to confidence to solve

environmental innovation problems (Meirun et al., 2024). Employees feel employees' ideas are valued and not just tolerated, and their environmental knowledge and capabilities are fully utilized when leaders accept their ideas for innovation. Secondly, GHL creates green optimism. Leaders who have positive expectations for the development of sustainable futures send the message that the sustainability challenge is not insurmountable and that employee actions are important (Luthans et al., 2015) that fosters creative thinking about how to contribute to a sustainable future. Finally, GHL creates green hope by planning energy and pathway towards goals. Humble leaders share in problem solving and consider new ways to reach environmental targets (Huang & Liu, 2025), which involves flexing thinking and improving creative potential. Fourth, GHL boosts green resilience. Resistance, uncertainty, and obstacles are common challenges faced by sustainability programs. Humble leaders who foster adaptive responses to their own inadequacies prompt their workforce to consider problems as learning opportunities instead of failures and sustain a creative approach to problem solving in challenging times (Abdou, 2025). According to Meirun et al. (2024) and Huang & Liu (2025), high GPC employees have higher confidence in generating environmental ideas, more optimism in dealing with uncertainty, and higher resilience in overcoming obstacles to maintain creative engagement.

H2: GPC mediates the positive association between GHL and GC.

2.8 The Mediating Role of Green Autonomy

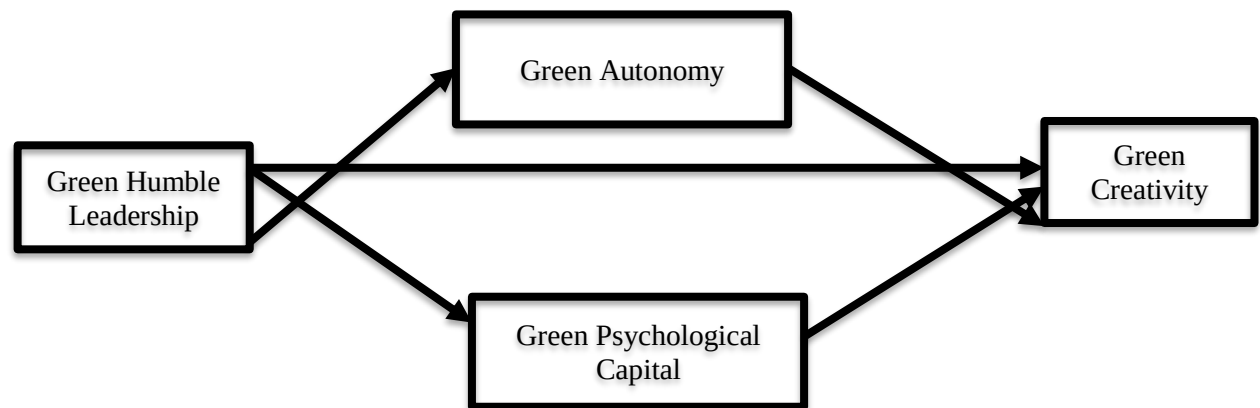
GHL could increase GA by having confidence in employees' environmental skills and by encouraging participation and reducing hierarchy. Recognizing their own lack of environmental knowledge and seeking employee input demonstrates that employees have valuable environmental knowledge and are trusted to use it. Liu and Wen (2025) stated that autonomy satisfaction is essential for intrinsic motivation and creativity in SDT. If employees feel free to experiment with sustainable practices and make decisions on environmental initiatives, they are more likely to come up with creative ideas and solutions. In the hospitality sector, this mechanism is especially powerful there are numerous ways to make the environment better through day-to-day service and activities.

H3: GA mediates the positive association between GHL and GC.

2.9 Conceptual Framework

This study introduces a parallel mediation model of the relationship between GHL and GC, with GPC and GA as two parallel mediators through which the impact of GHL on GC is mediated (Figure 1).

Figure 1. Conceptual Model



Source(s): Author's own Creation

The framework incorporates SDT as the theoretical perspective while GHl serves as the independent variable, GPC and GA are parallel mediators, and GC is the dependent variable.

3. METHODOLOGY

3.1 Research Context and Rationale

This study was carried out in the hotel sector of Pakistan for various important reasons. The country's tourism and hospitality industry has experienced rapid growth and plays a significant role in the national economy, and there is a much higher demand for sustainable development and adoption of green innovation, especially in ecologically sensitive areas such as Swat Valley and the northern region of the country (Bilal & Adil, 2024). The hospitality industry is also facing specific sustainability issues, like those faced by other developing sectors, such as resource constraints, changing regulatory landscapes, and the conflicting demands of economic development and environmental preservation (Munir et al., 2025). Frontline staff with hands-on expertise in the business but no ability to drive innovation and sustainable change have been identified throughout the sector, offering a practical relevance for humble leadership research to be used to unlock frontline staff innovation potential through traditional hierarchical management approaches (Imran et al., 2025). Lastly, increasing focus on environmental certification, green marketing, and sustainable tourism development in the hospitality sector in Pakistan supports the role of employees in creating environmental innovations (Durrani et al., 2025).

3.2 Research Design

This study used a quantitative, cross sectional survey research design. All the study constructs were measured using a structured questionnaire and the hypothesized relationships were tested using partial least squares structural equation modeling (PLS-SEM). The cross-sectional design allowed for the investigation of the proposed associations in the current organizational context, and the anonymity and standardized administration allowed for reduction of response-related

bias. The interpretation of the findings is presented in the aspects of association and indirect effect as the design only captures variables at a single point in time and thus does not provide evidence of temporal causality.

3.3 Sampling and Data Collection

The respondents of the study were the front-line employees of four and five-star hotels in the main tourist hubs of Swat, Madyan and Bahrain in Pakistan. The immediate managers' green-humble behaviors were assessed, while the respondents' green psychological capital and their perceived green autonomy were reported as well as their own green creativity. The hotels chosen were upscale hotels, because they had more organizational structures that fostered the study of green leadership and creativity, more formal sustainability policies, and more environmental management practices. The sample was stratified and random to provide representation by hotel category and geographic area. Hotels were identified by Pakistan Tourism Development Corporation (PTDC) and industry associations, and 45 hotels were selected in each of the three locations. Front line staff in the areas of Front Desk, Housekeeping, Food and Beverage Service and Maintenance who had been with the company for 6 months and who reported under the direct supervision of a departmental manager were eligible to participate. Data collection was conducted in January 2026 during the winter tourism season and was different to the summer-season data collection reported in the related study of the GHl–GC relationship (Shah et al., 2026) with different sample and respondents and not based on the same dataset.

Sample size was considered regarding the structural model and the statistical power. The final model included 24 indicators on four latent constructs, and a minimum number of approximately 200 cases were aimed at getting enough statistical power for modelling estimation. Five hundred questionnaires were sent out, and 327 complete questionnaires were returned (65.4%). In all, 286 cases were valid, for an effective response rate of 57.2%, after discarding those cases where the answers were incomplete and/or of poor quality. The final sample was larger than the minimum required for the intended PLS-SEM analysis

and was therefore deemed suitable for this purpose. The retained cases were checked for missing values, outliers and inattentive and straight-line response patterns before structural analysis and no cases needed to be excluded beyond the above screening.

3.4 Measurement Instruments

All constructs were assessed on 5-point Likert scales (1 = strongly disagree to 5 = strongly agree) that were modified from previously validated multi-item scales in the hospitality and sustainability literature (see Appendix A). This study measured GHL with a 5-item scale designed from Owens et al. (2013) that includes leadership behaviors that are contextually related to the issue of sustainability in the environment. GPC was operationalized using a 6-item scale adapted from Chen and Yan (2022) that measures employees' self-efficacy, optimism, hope and resilience in relation to environmental activities. GA was determined based on a 5-item scale adapted from Maitlo et al. (2022), which measures the perception of discretion in developing, questioning, experimenting with and deciding on green practices. GC was measured by a scale of eight items adapted from Chen and Chang (2013) that captured the self-reported generation of new and useful ideas that employees had to solve environmental problems. Confirmed that the variables of age, gender, education level and organizational tenure were related to creativity and environmental attitudes.

3.5 Data Analysis Procedure

Data processing was done in two phases based on SmartPLS 4 (Ringle et al., 2024). Indicator reliability,

internal consistency, convergent validity, and discriminant validity were tested in the first place by indicator loadings, Cronbach's alpha, composite reliability (rho_c), and average variance extracted (AVE) followed by the Heterotrait-Monotrait ratio (HTMT) to ensure the reliability of the indicators, consistency, convergent validity, and discriminant validity. Secondly, the structural model was evaluated using path coefficients, bootstrapped t statistics and p values, confidence intervals, R², f², and inner model VIF. The direct and indirect effects were assessed as statistically significant if the 95% confidence intervals did not contain 0 upon resampling 5,000 times. SRMR was reported as a "model fit" index for an approximate model. This procedure is like what is done in a PLS-SEM approach and does not consider covariance-based CFA as a separate estimation procedure.

4. RESULTS

4.1 Sample Characteristics

The final sample (N = 286) comprised 151 male respondents (52.8%) and 135 female respondents (47.2%). Age distribution showed that 79.0% were aged 18–25 years, 18.5% were aged 26–35 years, 2.1% were aged 36–45 years, and 0.3% were aged 46–55 years. In terms of education, 69.2% of individuals had an undergraduate degree, 21.0% of individuals had a graduate degree, and 9.8% of individuals had a postgraduate degree. A total of 47.2% of respondents had been in their organizations for 4–6 years, 25.9% were in their organizations for 7–9 years, and 26.9% had been in the organization for 11 years or more. A demographic profile is provided in Table 1, Panel A.

Table 1. Measurement Model Assessment

Panel A: Sample Demographic Characteristics (N = 286)			
Characteristic	Category	Frequency	Valid %
Gender	Male	151	52.8
	Female	135	47.2
Age	25–30 years	226	79.0
	30–35 years	53	18.5
	36–45 years	6	2.1
	46–55 years	1	0.3
Education	Undergraduate	198	69.2
	Graduate	60	21.0
	Postgraduate	28	9.8
Tenure	1–5 years	135	47.2
	6–10 years	74	25.9
	11 years and above.	77	26.9
Panel B: Reliability and Convergent Validity			
Construct	Cronbach's α	CR	AVE
GHL	0.893	0.921	0.699
GC	0.904	0.923	0.600
GPC	0.844	0.884	0.560
GA	0.863	0.901	0.646

Panel C: Latent Variable Correlations				
Construct	GA	GC	GHL	GPC
GA	1			
GC	0.364	1		
GHL	0.221	0.328	1	
GPC	0.300	0.270	0.247	1

Panel D: Outer Loadings		
Construct	Indicator	Loading
GHL	GHL1	0.832
	GHL2	0.871
	GHL3	0.819
	GHL4	0.82
	GHL5	0.84
GC	GC1	0.776
	GC2	0.787
	GC3	0.772
	GC4	0.752
	GC5	0.818
	GC6	0.78
	GC7	0.714
	GC8	0.793
GPC	GPC1	0.745
	GPC2	0.723
	GPC3	0.742
	GPC4	0.769
	GPC5	0.748
	GPC6	0.771
GA	GA1	0.758
	GA2	0.767
	GA3	0.832
	GA4	0.823
	GA5	0.838

Panel E: Discriminant Validity (HTMT)	
Construct Pair	HTMT
GHL–GC	0.365
GHL–GPC	0.283
GHL–GA	0.252
GC–GPC	0.309
GC–GA	0.412
GPC–GA	0.353

Panel F: Fornell–Larcker Criterion				
Construct	GA	GC	GHL	GPC
GA	0.804			
GC	0.364	0.775		
GHL	0.221	0.328	0.837	
GPC	0.300	0.270	0.2470	0.750

Source(s): Author's own Creation

4.2 Reliability Analysis and Convergent Validity

The internal consistency and the convergent validity were satisfactory for all four constructs. The internal consistency reliability (Cronbach's alpha) ranged from 0.844 for GPC to 0.904 for GC, and composite reliability (rho_c) ranged from 0.884 to 0.923. AVE ranged between 0.560 and 0.699, which is higher than 0.50 for all

constructs. Indicator loadings were between 0.713 and 0.872 which is good indicator reliability. The results presented in Table 1, Panel B show that the measurement model has sufficient reliability and convergent validity of the following structural analysis.

Table 1, Panel C shows that all latent construct correlations were positive and below 0.85. The strongest

association was between GA and GC ($r = 0.364$), whereas the weakest was between GHL and GA ($r = 0.221$). These correlations indicate that the constructs are related but empirically distinct, providing preliminary support for discriminant validity.

As shown in Table 1, Panel D, all outer loadings were above the recommended 0.70 threshold, ranging from 0.714 to 0.871. These results provide support for indicator reliability and confirm that the measurement items adequately reflect their respective constructs.

4.3 Discriminant Validity

The HTMT criterion was used to test discriminant validity. All HTMT values were below 0.85, ranging from 0.252 (GHL–GA) to 0.412 (GC–GA). The other combinations of the constructs were also significantly lower than the recommended levels. The results show that the measures of GHL, GC, GPC and GA are empirically separable constructs as reported in Table 1, Panel E.

Table 1, Panel F reports the Fornell–Larcker criterion. The

square roots of the AVE for GA (0.804), GC (0.775), GHL (0.837), and GPC (0.750) were all greater than the corresponding inter-construct correlations. This confirms that each construct shares more variance with its own indicators than with other constructs, supporting discriminant validity.

4.4 Structural Model and Hypothesis Testing

The relationships between the structures were analyzed in the direct path through PLS-SEM (Table 2, Panel A) with 5,000 bootstrap resamples. GHL was positively associated with GC ($\beta = 0.237$, $t = 4.407$, $p < 0.001$; 95% CI [0.131, 0.338]), supporting H1. GHL was also positively associated with GPC ($\beta = 0.258$, $t = 4.855$, $p < 0.001$; 95% CI [0.161, 0.369]) and GA ($\beta = 0.229$, $t = 4.050$, $p < 0.001$; 95% CI [0.118, 0.342]). In turn, GPC was positively associated with GC ($\beta = 0.138$, $t = 2.448$, $p = 0.014$; 95% CI [0.029, 0.251]), while GA showed a stronger positive association with GC ($\beta = 0.270$, $t = 5.128$, $p < 0.001$; 95% CI [0.170, 0.377]).

Table 2. Structural Model Results

Panel A: Direct Path Coefficients					
Path	Original Sample (O)	Sample Mean (M)	STDEV	T Statistics	P Values
GHL → GC	0.237	0.236	0.054	4.407	< 0.001
GHL → GPC	0.258	0.266	0.053	4.855	< 0.001
GHL → GA	0.229	0.234	0.056	4.05	< 0.001
GPC → GC	0.138	0.143	0.056	2.448	0.014
GA → GC	0.270	0.274	0.053	5.128	< 0.001
Panel B: Specific Indirect Effects					
Path	Original Sample (O)	Sample Mean (M)	STDEV	T Statistics	P Values
GHL → GPC → GC	0.035	0.038	0.017	2.064	0.039
GHL → GA → GC	0.062	0.064	0.021	2.943	0.003
Panel C: Total Effects					
Path	Original Sample (O)	Sample Mean (M)	STDEV	T Statistics	P Values
GHL → GC	0.334	0.339	0.052	6.401	< 0.001

Source(s): Author's own Creation

4.5 Mediation Analysis

The mediation results endorse both suggested indirect effects proposed in Table 2, Panel B. The indirect effect of GHL on GC through GPC was 0.035 ($t = 2.064$, $p = 0.039$, 95% CI [0.007, 0.076]), supporting H2. The indirect effect through GA was 0.062 ($t = 2.943$, $p = 0.003$, 95% CI [0.028, 0.110]), supporting H3. The total indirect effect was 0.097 ($t = 3.693$, $p < 0.001$, 95% CI [0.050, 0.149]), and the total effect of GHL on GC was 0.334 ($t = 6.401$, $p < 0.001$) shown in Table 2, Panel C. In this sample, the indirect effect of GA is greater than that of the GPC, suggesting a stronger indirect effect of GA.

4.6 Predictive Power and Effect Sizes

The R-squares represent the percentage of the variance in endogenous constructs explained. GPC had an R^2 of 0.066, GA had an R^2 of 0.052, and GC had an R^2 of 0.216, meaning that the model accounts for 21.6% of the variation in green creativity. These values are reported in Table 3, Panel A. Panel B of Table 3 represent the effect size analysis revealed small effects of GHL on GPC ($f^2 = 0.071$) and GA ($f^2 = 0.055$), as well as small effects of GHL on GC ($f^2 = 0.065$), GPC on GC ($f^2 = 0.021$), and GA on GC ($f^2 = 0.082$). The inner model VIF values were all below 5, ranging from 1.000 to 1.148, and thus no evidence of problematic multicollinearity (see Table 3, Panel C).

Table 3. Predictive Power and Effect Sizes

Panel A: R-Square Values		
Construct	R ²	R ² Adjusted
GPC	0.066	0.063
GA	0.052	0.049
GC	0.216	0.208
Panel B: Effect Sizes (f ²)		
Path	f ²	Effect Size
GHL → GPC	0.071	Small
GHL → GA	0.055	Small
GHL → GC	0.065	Small
GPC → GC	0.021	Small
GA → GC	0.082	Small
Panel C: Inner Model Collinearity Statistics (VIF)		
Path	VIF	
GA → GC	1.131	
GHL → GA	1.000	
GHL → GC	1.101	
GHL → GPC	1.000	
GPC → GC	1.148	

Source(s): Author's own Creation

4.7 Model Fit

Model Saturated SRMR = 0.048 and estimated SRMR = 0.068. These values are both less than 0.08, which meets the criterion reported in the study by Hu and Bentler (1999) for approximate fit. Both d_ULS and d_G are also

presented in Table 4, Panel A. Both indirect effects are statistically significant as the two corresponding bootstrapped confidence intervals do not contain the value of zero Table 4, Panel B. The hypothesis-testing summary is summarized in Table 4, Panel C.

Table 4. Model Fit and Hypothesis Summary

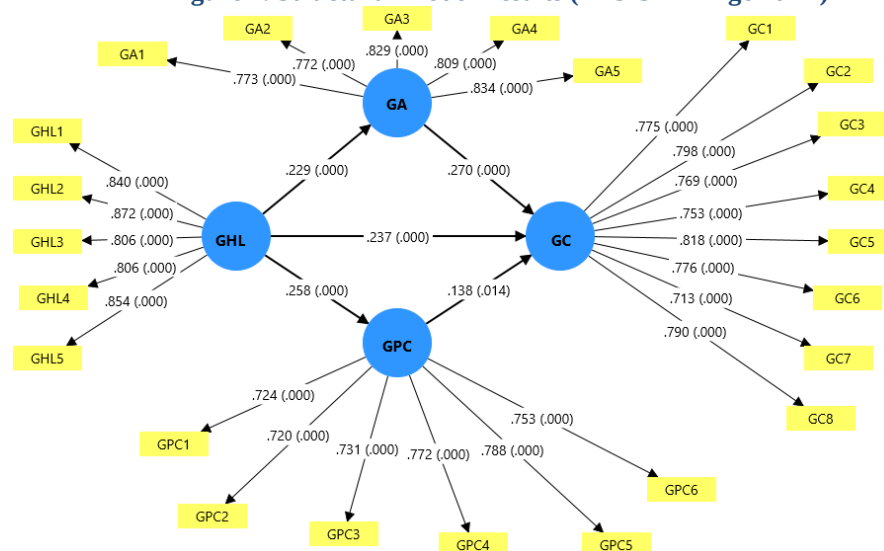
Panel A: Model Fit Indices			
Measure		Saturated Model	Estimated Model
SRMR		0.048	0.0679
d_ULS		0.706	1.381
d_G		0.209	0.221
Panel B: Confidence Intervals for Indirect Effects			
Path	Original Sample (O)	2.50%	97.50%
GHL → GPC → GC	0.035	0.007	0.076
GHL → GA → GC	0.062	0.028	0.110
Panel C: Hypothesis Testing Summary			
Hypothesis	β	p-value	Decision
H1: GHL → GC	0.237	< 0.001	Supported
H2: GHL → GPC → GC	0.035	0.039	Supported
H3: GHL → GA → GC	0.062	0.003	Supported

Source(s): Author's own Creation

The summary of the results obtained from the structural model is shown in Figure 2. The direct paths of GHL to GPC and GA were positive and statistically significant ($\beta = 0.258$, $\beta = 0.229$, respectively). All mediators showed positive association with GC with the coefficient of GA ($\beta = 0.270$) being higher than GPC ($\beta = 0.138$). The model

accounts for 21.6% of the variance in GC. Indicator reliability was high with indicator loadings between 0.713 and 0.872.

Figure 2. Structural Model Results (PLS-SEM Algorithm)



Source(s): Author's own Creation

5. Discussion and Conclusion

This study compares the relationship between GHL and employee GC to the relationship between GPC and GA to determine if they both parallel this relationship. The results showed that there were positive relationships between GHL and GC, with GPC and GA also having indirect effects, thus supporting all three of the hypotheses. The results thus offer empirical support for a two-pathway explanation: that sustainability-oriented humility relates to green creativity via psychological resources and perceived discretion to act.

5.1 Direct Effect of GHL on Green Creativity

The high level of direct effect of GHL on GC ($\beta = 0.237$, $p < 0.001$) shows that there is a positive association between the sustainability oriented humble leadership and the creation of novel and useful ideas of the employees related to environment. This is in line with the general literature that indicates that humility can facilitate creativity, and with the hospitality literature that suggests a relationship between environmentally oriented leadership and employee creativity (Liu et al., 2024; Meirun et al., 2024; Owens et al., 2013). Moreover, this study also advances recent GHL research by using an alternative mediation approach, albeit it did not consider the intervening psychological process as a step to green creativity (Shah et al., 2026; Durrani et al., 2025).

5.2 Mediating Role of Green Psychological Capital

The indirect effect via GPC was significant ($\beta = 0.035$, $p = 0.039$) which substantiated the proposed psychological-resource pathway. The findings are in line with the idea that psychological resources such as green self-efficacy, optimism, hope, and resilience can help employees persevere in the process of environmental problem-solving in the face of uncertainty and obstacles (Huang & Liu, 2025; Chen & Yan, 2022; Luthans et al., 2015). The finding is an extension of this logic, linking those resources which are green-specific to GHL in the same model. The effect is statistically significant, but smaller than the GA pathway (0.035 compared to 0.062), thus the evidence indicates that GPC is an important, but

comparatively weaker pathway in this sample. Media effect is an indirect effect according to the cross-sectional design and is not necessarily a causal effect.

5.3 Mediating Role of Green Autonomy

The indirect effect via GA pathway was also greater ($\beta = 0.062$, $p = 0.003$) than the effect via the GPC pathway. The direct relationship between GA and GC was also significantly greater than that between GPC and GC ($\beta = 0.270$ versus $\beta = 0.138$). This pattern aligns with previous studies that showed autonomy is related to green creativity and with the emphasis SDT places on autonomy as a fundamental psychological need that assists in volitional functioning and intrinsic motivation (Maitlo et al., 2022; Deci et al., 2017; Ryan & Deci, 2000). It does not mean that autonomy is a more important aspect of job requirements than competence or relatedness for every worker, but rather that, in this model and sample, the perceived autonomy to experiment and make green decisions is a closer link to green creativity than other job requirements. It is particularly applicable to the hospitality sector where many of the sustainability enhancements are reliant on the discretion of front-line staff.

5.4 Parallel Mediation and Theoretical Integration

The importance of both indirect pathways strengthens the importance of the psychological resources and perceived discretion in the same SDT-based model. GPC represents employees' internal ability to persist with environmental challenges, while GA represents the employee perception of freedom to act on environmental ideas. The effect of GHL on GC was significant ($\beta = 0.334$, $p < 0.001$) and the model accounted for 21.6% of the variance in GC. The parallel configuration thus provides explanatory detail in addition to a direct GHL–GC relationship. However, this stronger GA pathway needs to be interpreted with caution because it represents an empirical pattern in this sample and not evidence that autonomy is a stronger mechanism than psychological capital globally.

5.5 Theoretical Implications

This study has four theoretical contributions. First, it brings empirical evidence to the growing body of literature on GHL emphasizing the positive correlation

between humble leadership and employee GC in the hospitality sector. Second, it recognizes that while some empirical evidence exists for a connection between GHL and GC, this connection is mediated by two empirically distinct pathways (GPC and GA). Third, it builds on the application of SDT to sustainable hospitality by linking up between need-supportive leadership and psychological resources and perceived green autonomy. Fourth, it provides contextual evidence from the Pakistani hospitality industry, alongside of studies performed in other national and organizational contexts. The main contribution is thus the integration and empirical testing of these constructs in a parallel mediation model, not the invention of the constructs themselves.

5.6 Practical Implications

Key implications for hospitality companies looking to augment their frontline green creativity are derived from the findings. Firstly, the systematic development of GHL in managers should be done through interventions. Programs should focus on developing managers' skills to recognize their lack of environmental knowledge, proactively seek employee feedback on sustainability issues, and express appreciation for employee green initiatives, rather than providing leadership development training in general. Structured reflection exercises in which managers articulate what they don't know, "green idea" sessions in which employees share ideas and managers listen and respond with modesty and gratitude, and 360-degree environmental feedback that focuses on the behaviors involved in environmental humility are examples of practical mechanisms.

Second, organizations should pay attention to delegating their first line of business employee's actual choice of environmental initiatives. This will involve a series of structural changes that include a fast-track policy to approve employee initiated green experiments, small sums of money for green innovations on the front line of work and a formal recognition of the employee's contribution to sustainability improvement. Managers need to be trained to not try to do everything for their employees when it comes to green initiatives, but to ask them questions and let them try on their own and accept failure as a learning experience.

Third, that GPC played a significant role in the effects of GHL, organizations should focus on developing their employees' green psychological capital by providing environmental training on enhancing self-efficacy (hands-on environmental projects), communicating positive expectations with respect to effect on the environment (sharing success stories and progress), supporting pathway planning for environmental goals (helping employees plan steps towards implementing environmental ideas), and building resilience through supporting responses to environmental project setbacks. Leadership learning interventions are most effective when trained by individuals who demonstrate GHL behaviors, and the training and actual behaviors are consistent.

5.7 Economic and Policy Implications

The findings also have economic and policy implications, which should be viewed as prospective instead of causal effects. Hotels which provide the conditions for employee green creativity could discover resource-efficiency

enhancements and new services which can help enhance the environmental performance and operational competitiveness (Rubel et al., 2025; Shehzad et al., 2024). Policy could be more focused on leadership development and employee empowerment in addition to formal environmental management systems, and tourism regulation and hotel certification systems could focus more on the aspect of employees and leadership development. These methods can go beyond just following the procedures and can enable organizations to experiment and continuously improve with their employees. These implications are based on the positive relationships observed and the mediation pathways and need to be further tested with longitudinal and multi-source designs.

5.8 Limitations and Future Research Directions

The following limitations must be noted. First, the cross-sectional design carries the limitation that it does not allow causal inferences, as would be the case if a longitudinal, multi-wave or field-experimental design were used, where it would be able to provide stronger evidence for temporal ordering. Second, all focal constructs were assessed with self-report questionnaires leading to the possibility of common method variance. The results of the present study do not yield a formal marker-variable or single-factor statistical test because of the anonymous and standardized administration procedures, so future studies should combine supervisor ratings, objective green outcomes, or temporally separated measures. Third, the study is limited to the frontline employees of the selected four and five-star hotels in Swat, Madyan and Bahrain, thereby limiting generalizability to the other categories of hotels, other industries and national context. Fourth, GHL accounts for relatively small amounts of variance in GPC (0.066) and GA (0.052), suggesting that other individual, job, leadership and organizational factors play a role as well. Psychological safety, green intrinsic motivation, knowledge sharing, environmental values, and organizational climate are possible mechanisms or boundary conditions that deserve further study in the future. Fifth, the two studies were conducted in different pools of respondents, using different sampling strategies (stratified random sampling of 4- and 5-star hotels as opposed to convenience sampling in the earlier study), in different tourism seasons, and with different modeling techniques and mediating mechanisms, which is why the present study is best read as a theoretical extension that tests different psychological pathways and no replication of the earlier sample. Last, the more robust GA pathway should be replicated in various settings prior to considering it a generic theory order of mechanisms.

6. CONCLUSION

This study has evident that GHL is positively related to employee GC both directly and indirectly via GPC and GA. Both mediators were statistically significant, with the indirect pathway of GA larger in the present sample. The results contribute to SDT literature by demonstrating that green-specific psychological resources and perceived discretion can both be regarded in one framework. The study also provides context specific evidence from

Pakistan's hospitality sector, which involves a significant number of frontline employees in everyday problem solving in relation to the environment. The results indicate that sustainability initiatives could be bolstered if leadership explicitly expresses sustainability values and provides psychological resources for employees and allows them adequate discretion to generate and implement green ideas.

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