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# GREENING LEADERSHIP IN DEVELOPING ECONOMIES: LINKING ENVIRONMENTAL TRANSFORMATIONAL LEADERSHIP, GREEN SELF-EFFICACY, AND PSYCHOLOGICAL GREEN CLIMATE TO ENVIRONMENTAL PERFORMANCE

**Aasim Naimat Gill[*1], Dr. Yasir Iftikhar[2], Rimsha Suman[3], Hammad Zafar[4], Ahmad Zaheer[5], Muhammad Usman Islam[6]**

*[*1]PhD Scholar Green Business School, Green International University*
*[2]Assistant Professor Green Business School, Green International University*
*[3,5]Research Scholar Lahore Business School, University of Lahore*
*[4]PhD Scholar Lahore Business School, University of Lahore*
*[6]Senior Lecturer, University of Central Punjab*

[*1]aasim.gill@giu.edu.pk,[2]yasiriftikhar@giu.edu.pk,[3]summanshakil786@gmail.com,
[4]hammadzafar44@hotmail.com, [5]m.ahmadzaheer09@gmail.com, [6]usman.islam@ucp.edu.pk

**Corresponding Author: ***
**Aasim Naimat Gill**
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## ABSTRACT

*Organizations and companies in underdeveloped countries are under intense pressure from stakeholders and government watchdogs to focus on improving the environmental performance. Despite this, the leadership responsible for transforming environmental outcomes through psychological mechanisms is absent.*

*Based on the Social Cognitive Theory, this study will explore how Environmental Transformational Leadership (ETL) directly impacting in enhancing the Environmental Performance (EP) through the mediating role and influence of Employee Green Self-Efficacy (EGS) and Psychological Green Climate (PGC).*

*Based on the quantitative and cross-sectional survey design, more than 300 employees took part in the questionnaire. The analysis was conducted using a partial least squares structural equation modeling (PLS-SEM) with bootstrapping (5,000 resamples). Results strongly favored the proposed framework as suggested in the research paper. ETL positively predicts EP and exerts a substantial positive effect on EGS, while EGS, in turn, significantly improves EP. Mediation analysis confirms that EGS partially mediates the ETL–EP relationship, indicating that leadership strengthens environmental performance primarily by enhancing employees' confidence in their ability to carry out environmentally responsible tasks. Furthermore, moderation results show that PGC strengthens the effect of ETL on EGS, suggesting that environmentally transformational leadership is more effective when employees perceive the organizational context as supportive of environmental values, norms, and practices. Overall, the study advances the leadership–cognition–performance pathway by integrating a cognitive mediator and a contextual boundary condition, and it offers actionable implications for organizations in developing economies seeking to strengthen environmental performance through leadership development, employee empowerment, and climate-building interventions.*

***Keywords:*** *Environmental transformational leadership; green self-efficacy; psychological green climate; environmental performance; sustainability; PLS-SEM.*

## 1.INTRODUCTION

The accelerating pace of industrialisation and urban expansion in the twenty-first century has profoundly intensified global environmental challenges such as climate change, resource depletion, and ecosystem degradation (Chen et al., 2022; Iftikhar et al., 2024). Organisations across the world are under mounting pressure from regulators, consumers, and stakeholders to minimise their ecological footprint and adopt sustainable practices that ensure long-term environmental performance. However, despite rising awareness, many organisations, especially in developing economies such as Pakistan, struggle to translate environmental intentions into tangible outcomes.

Accordingly, this study focuses on Environmental Performance (EP), representing an organisation's ability to reduce environmental harm through improved operational, behavioural, and strategic practices. According to Singh et al. (2020, p. 52), environmental performance is "the measurable outcome of an organisation's activities that contribute to minimising environmental impact and enhancing ecological sustainability." EP is not limited to pollution control; it includes efficient energy use, waste reduction, and the integration of green innovation into business operations (Naseem et al., 2023). Thus, EP serves as a meaningful dependent variable because it captures not only the environmental outcomes of organisational behaviour but also reflects how well employees, systems, and leadership align to produce sustainable results.

To enhance environmental performance, leadership plays a pivotal role in shaping employee attitudes and behaviours (Zhao & Li, 2023). Environmental Transformational Leadership (ETL) is defined by Robertson and Barling (2013, p. 180) as "a manifestation of transformational leadership in which the substance of the leadership behaviours is focused on strengthening pro-environmental measures." ETL extends the classical dimensions of transformational leadership, idealised influence, inspirational motivation, intellectual stimulation, and individualised consideration, toward ecological goals (Chen & Chang, 2013). Leaders who demonstrate ETL articulate a compelling environmental vision, encourage creative solutions to sustainability problems, and empower employees to take ownership of environmental initiatives. Recent studies in emerging economies indicate that ETL exerts a positive influence on environmental performance by aligning employees' values and behaviours with organisational sustainability objectives (Ahmad et al., 2022; Khan et al., 2024).

However, the understanding of the explanatory mechanisms and boundary conditions underlying the relationship between ETL and EP remains limited (Chen et al., 2022). Such understanding is crucial for advancing theoretical insight, as it elucidates the underlying processes (mediating effects) and contextual conditions (moderating effects) that explain how and when leaders' pro-environmental behaviours translate into enhanced environmental outcomes (Robertson & Barling, 2017). Accordingly, the present study conceptualises Employee Green Self-Efficacy (EGS) as a mediating mechanism linking ETL and EP, based on the premise that transformational leaders inspire confidence, competence, and intrinsic motivation in employees to engage in environmentally responsible actions (Liu et al., 2021). Green self-efficacy reflects employees' belief in their ability to perform environmentally sustainable tasks. Environmentally transformational leaders enhance this belief by modelling and encouraging pro-environmental behaviours, empowering employees to act sustainably. Studies show that green self-efficacy mediates the link between transformational leadership and improved environmental performance.

Social Cognitive Theory (SCT) (Bandura, 1986, 1997) underpins this study by explaining that employees' environmental behaviour emerges from the ongoing interaction of environmental cues, personal beliefs, and actions. Within this framework, ETL serves as a strong social influence, as leaders who model pro-environmental values, offer encouragement, and provide opportunities for employees to observe green behaviours help build EGS, employees' confidence in their ability to perform eco-friendly tasks (Chen, 2014). When employees believe they are capable, they are more motivated and persistent, leading to stronger EP through greater initiative and sustained engagement in green practices (Bandura, 1997; Robertson &

Barling, 2017). This process becomes even more effective in a supportive Psychological Green Climate (PGC), which amplifies the EGS-EP relationship by signaling that environmental efforts are valued and encouraged (Paillé et al., 2014). Thus, ETL strengthens self-efficacy, PGC reinforces how that confidence translates into behaviour, and together they reflect SCT's principle of triadic reciprocity, where environmental stimuli (leadership), cognitive mechanisms (self-efficacy), and behavioural outcomes (environmental performance) interact to shape sustainable behaviour in organisational settings.

The main objective of this study is to address gaps in the environmental performance literature by examining how ETL enhances EP through the mediating role of EGS and the moderating effect of PGC. This research explores the underlying mechanisms and contextual factors that explain how environmentally responsible leadership behaviours translate into sustainable outcomes. By proposing and testing a mediated moderation model, the study offers new insights into the dynamic interaction between leadership, employee cognition, and organisational climate. Focusing on developing economies such as Pakistan, it provides valuable guidance for organisations seeking to strengthen environmental performance through empowered employees and supportive green climates. Overall, this study enriches the environmental transformational leadership and sustainability literature by linking environmental performance, self-belief, and context-driven performance.

This study makes several important contributions to the environmental management and sustainability literature. First, it advances existing knowledge by explaining how and under what conditions ETL influences EP. By identifying EGS as a key mediating mechanism and PGC as a moderating factor in the EGS and EP relationship, the study offers a novel understanding of the cognitive and contextual processes through which leadership drives environmental outcomes. Second, by developing and empirically validating a mediated moderation framework, the research extends the scope of prior leadership and environmental performance models that have largely overlooked the combined roles of employee green self-efficacy and organisational climate. Finally, by focusing on developing economies such as Pakistan, this study contributes context-specific evidence and practical insights for organisations aiming to institutionalise environmental transformational leadership, empower employees, and cultivate climates supportive of superior environmental performance.

## 2. Theoretical Background And Hypotheses Development

### 2.1 Social Cognitive Theory

This study is grounded in **Social Cognitive Theory (SCT)**, which posits that human agency is exercised through a triadic reciprocal interaction between personal, environmental, and behavioral factors (Bandura, 1986). A cornerstone of SCT is self-efficacy, the belief in one's capability to organize and execute actions required to achieve specific goals (Bandura, 1997). In organizational contexts, leadership behaviors serve as critical social cues that employees observe and internalize, thereby shaping their cognitive appraisals and behavioral choices (Wood & Bandura, 1989). Transformational leaders influence followers not only through verbal persuasion but also through role modeling, providing vicarious learning opportunities that enhance employees' perceptions of agency (Avolio & Bass, 1995). When directed toward sustainability, these leadership signals communicate that ecological responsibility is valued and achievable, heightening employees' confidence to perform green tasks.

Recent empirical evidence reinforces the utility of SCT in environmental leadership research. Studies demonstrate that leaders who articulate clear green visions and demonstrate eco-friendly behaviors significantly boost employees' environmental confidence and commitment (Chen et al., 2022; Butt et al., 2024). Furthermore, observational learning and verbal encouragement from supervisors strengthen the belief that employees can successfully execute tasks such as waste reduction, energy conservation, and eco-innovation (Graves & Sarkis, 2018; Singh et al., 2023). These mastery experiences and social persuasions are essential

for converting leadership intent into proactive employee action.

SCT also emphasizes the role of environmental cues within the firm. When contextual signals, such as rewards, norms, and formal expectations, align with pro-environmental values, employees perceive leadership messages as credible and meaningful (Norton et al., 2017; Paillé & Mejía-Morelos, 2020). Thus, SCT provides a robust foundation for understanding the "leadership-cognition-behavior" pathway. It explains why employees who observe environmentally responsible leaders are more likely to develop the necessary confidence to engage in sustainability practices, ultimately contributing to superior organizational environmental performance.

### 2.2 Environmental Transformational Leadership and Environmental Performance

Environmental Transformational Leadership (ETL) extends traditional transformational theory into the sustainability domain by emphasizing visionary, inspirational, and change-oriented behaviors (Robertson & Barling, 2013). ETL leaders articulate a compelling environmental vision, challenge unsustainable routines, and model eco-friendly behavior. This modeling effect aligns with Social Cognitive Theory (SCT), which posits that individuals internalize behaviors through observation and social persuasion (Bandura, 1997). Empirical evidence confirms that ETL significantly enhances pro-environmental behaviors, such as energy conservation and waste reduction (Graves et al., 2013). Recent scholarship further shows that ETL cultivates stronger environmental commitment, green innovation, and organizational citizenship behavior for the environment (OCBE) (Kim et al., 2021; Shafaei et al., 2022).

Research between 2021 and 2025 highlights ETL as a crucial antecedent of workplace sustainability. Li, Zhang, and Sun (2021) found that ETL enhances intrinsic motivation by fostering a sense of environmental responsibility. Similarly, Afsar and Umrani (2022) demonstrated that ETL promotes green creativity by encouraging employees to explore eco-innovative ideas. Recent findings indicate that ETL strengthens environmental norms and creates a workplace culture that improves the adoption of ecological behaviors (Chen et al., 2023; Zhang & Dong, 2024). Furthermore, ETL is linked to superior environmental innovation performance, particularly in organizations transitioning toward low-carbon operations (Huang et al., 2023).

While much of the existing literature focuses on individual-level outcomes like green voice or helping behaviors (Peng et al., 2022), there is a growing need to link these to Environmental Performance (EP). EP encompasses measurable organizational outcomes, including reduced emissions, energy efficiency, and waste minimization (Gürlek & Tuna, 2021). Drawing on SCT, a clear pathway emerges: ETL motivates employees, builds their environmental competence, and encourages collective action, which cumulatively enhances organizational results (Paillé et al., 2024). ETL leaders reinforce sustainability norms and facilitate structural changes that embed environmental considerations into daily operations. As employees internalize the vision modeled by leaders, their combined efforts generate measurable improvements in organizational EP. Thus, ETL serves as a strategic driver of environmental performance through motivation, capability-building, and cultural reinforcement.

**H1:** Environmental Transformational Leadership (ETL) positively influences Environmental Performance (EP).

### 2.3 The Mediating Role of Employee Green Self-Efficacy

Employee Green Self-Efficacy (EGS) refers to an individual's confidence in their capability to perform tasks that support environmental sustainability and ecological improvements within the workplace (Chen et al., 2014). Grounded in Social Cognitive Theory (SCT), self-efficacy is positioned as the central psychological mechanism linking environmental stimuli to behavioral responses. SCT explains that employees translate leadership signals into action through four primary sources: mastery experiences, vicarious learning, verbal persuasion, and emotional arousal (Bandura, 1997). Transformational leaders specifically bolster these beliefs by articulating high expectations and fostering an empowering

learning environment where employees feel capable of contributing to green goals (Afsar et al., 2016).

Recent scholarship from 2021 to 2025 further validates the mediating role of EGS in the leadership-sustainability nexus. Kim et al. (2021) observed that green leadership behaviors enhance employees' confidence to innovate eco-friendly solutions, subsequently driving higher green creativity. Similarly, Shafaei et al. (2022) demonstrated that employees with elevated EGS are more likely to engage in environmental citizenship behaviors, such as resource conservation and waste reduction. Latest evidence also highlights that EGS is a dynamic cognitive resource, rather than a static trait, that encourages employees to voice environmental concerns and proactively solve workplace ecological problems (Afsar & Umrani, 2022; Zhang & Dong, 2024).

Within the Environmental Transformational Leadership (ETL) framework, EGS serves as a critical psychological pathway to Environmental Performance (EP). ETL leaders elevate environmental competence by modeling responsibility and encouraging experimentation with green ideas. As employees internalize these leadership cues and perceive themselves as capable, they exhibit greater persistence and creativity in executing sustainability practices (Huang et al., 2023; Paillé et al., 2024). SCT suggests that self-efficacious employees are more resilient in the face of environmental challenges and more committed to organizational sustainability goals. Consequently, EGS converts leadership influence into tangible performance improvements by strengthening employee motivation and sustained engagement. Ultimately, EGS bridges the gap between leader-centric behaviors and organizational achievements, making it a pivotal mediator for the successful implementation of green initiatives.

**H2:** Environmental Transformational Leadership (ETL) positively influences Employee Green Self-Efficacy (EGS).

**H3:** Employee Green Self-Efficacy (EGS) positively influences Environmental Performance (EP).

**H4:** Employee Green Self-Efficacy (EGS) mediates the relationship between Environmental Transformational Leadership (ETL) and Environmental Performance (EP).

### 2.4 The Moderating Role of Psychological Green Climate

Psychological Green Climate (PGC) represents employees' shared perceptions that their organization values, supports, and rewards environmentally responsible behavior (Norton et al., 2017). As a perceptual construct, PGC functions as a "contextual filter" that dictates which behaviors are legitimized within the workplace. Grounded in Social Cognitive Theory (SCT), environmental cues are pivotal in determining how individuals interpret leadership signals and the extent to which social learning translates into behavioral outcomes (Bandura, 1997). Consequently, PGC acts as a critical boundary condition that strengthens or weakens the influence of Environmental Transformational Leadership (ETL) on employees' green cognitions.

When a strong PGC is present, employees view sustainability as a core organizational value, which amplifies the credibility and salience of ETL. In these environments, leadership messages are reinforced by formal policies, reward systems, and peer behaviors. This alignment creates a synergistic set of environmental cues that facilitate vicarious learning and bolster Employee Green Self-Efficacy (EGS). Recent empirical evidence confirms that supportive green climates enhance employee confidence and promote sustained participation in eco-initiatives (Yang et al., 2021; Shah et al., 2024). Essentially, a robust climate validates the leader's vision, signaling that environmental efforts are both expected and rewarded (Wesselink & Blok, 2022).

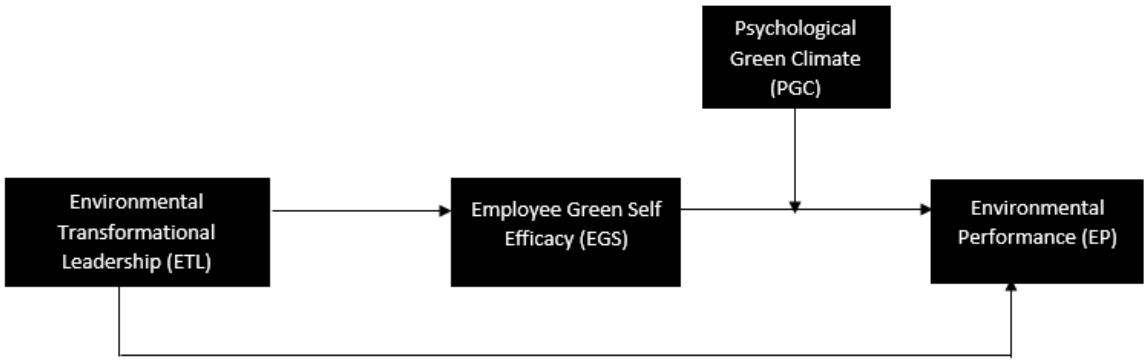
Conversely, in organizations with a weak PGC, the motivational impact of ETL is often diluted. Even the most inspiring transformational leaders may struggle to enhance EGS if employees perceive that green behaviors are not prioritized or rewarded by the organization. Research indicates that in climates lacking environmental support, employees experience uncertainty and a weaker internalization of leadership cues, limiting the conversion of self-

efficacy into proactive behavior (Gürlek & Tuna, 2021; Ahmad et al., 2023).

Ultimately, PGC determines the degree to which leadership-driven efficacy translates into sustainable action. By reinforcing environmental expectations and supporting social learning mechanisms, a strong PGC ensures that employees internalize leadership messages and believe in their capability to achieve environmental performance. This makes PGC an essential moderator in the proposed leadership-efficacy-performance framework.

**H5:** Psychological Green Climate (PGC) moderates the relationship between Environmental Transformational Leadership (ETL) and Employee Green Self-Efficacy (EGS), such that the relationship is stronger when PGC is high.

**Conceptual Framework**




**Variables, Roles, Items & Authors**

| Variable | Role | Abbre. | Original Scale Items | Author(s) & Year |
|---|---|---|---|---|
| **Environmental Transformational Leadership** | Independent Variable (IV) | **ETL** | 12 | Robertson & Barling (2013) |
| **Employee Green Self-Efficacy** | Mediator (M) | **EGS** | 6 | Chen et al. (2014) |
| **Psychological Green Climate** | Moderator (W) | **PGC** | 6 | Norton, Zacher & Ashkanasy (2014/2017) |
| **Environmental Performance** | Dependent Variable (DV) | **EP** | 6 | Henri & Journeault (2010); Singh et al. (2020) |

## 3.0 Methodology

This research utilizes a quantitative, cross-sectional design to examine the relationships between Environmental Transformational Leadership (ETL), Employee Green Self-Efficacy (EGS), Psychological Green Climate (PGC), and Environmental Performance (EP). Grounded in Social Cognitive Theory, the study collects primary data via a structured questionnaire from employees engaged in sustainability-related tasks. This approach mirrors methodological standards in leading sustainability journals (Bandura, 1997; Afsar & Umrani, 2022; Nguyen et al., 2024).

All constructs are operationalized using validated multi-item scales measured on a five-point Likert scale (1 = Strongly Disagree to 5 = Strongly Agree). Environmental Transformational Leadership is measured using scales adapted from Robertson and Barling (2013) and Afsar et al. (2016), reflecting the leader's ability to inspire green values. Employee Green Self-Efficacy is assessed via items from Chen et al. (2014) and Zhang and Dong (2024), capturing the cognitive confidence employees possess regarding their environmental capabilities.

To capture the contextual environment, Psychological Green Climate is measured using Norton et al.'s (2017) scale, which evaluates organizational expectations and rewards for eco-friendly behavior. Finally, Environmental Performance is assessed through items from Gürlek and Tuna (2021) and Paillé et al. (2024), focusing on operational metrics like energy efficiency, waste reduction, and eco-innovation. This rigorous instrumentation ensures the reliability of the data for testing complex mediation and moderation effects (Asghar et al., 2025).

### 3.1 Sample Size Determination (Rule Of Thumb Method)

The sample size for this study is determined using the Rule of Thumb (Heuristic Approach), which is widely employed in structural equation modeling (SEM) research. This rule suggests obtaining **at least 10** respondents for each measurement item (Bentler & Chou, 1987; Hair et al., 2023). The present study includes approximately **30 items** across the four constructs (ETL, EGS, PGC, EP), leading to a minimum required sample size of:

30 items×10 respondents per item=300 respondents30 \text{ items} \times 10 \text{ respondents per item} =300\text{respondents}30 items×10 respondents per item=300 respondents

This heuristic is widely accepted in methodological literature and frequently used in quantitative research published in Elsevier, Emerald, Taylor & Francis, and Springer outlets, especially when assessing complex mediation, moderation models. Therefore, the study aims to collect **300 valid responses**, ensuring adequate statistical power, reliable parameter estimation, and measurement stability.

### 3.2 Sampling And Participants

A non-probability purposive sampling technique will be employed to ensure that participants have direct experience with supervisory leadership, organizational operations, and environmental tasks. Eligible participants include employees aged 18 and above working under direct supervision in organizations operating across manufacturing, services, education, and environmentally regulated industries. Participants will be recruited through organizational networks, professional contacts, university affiliations, and workplace communication channels. Securing **300 respondents** aligns with SEM requirements and supports robust testing of the hypothesized relationships.

### 3.3 Measurement Instrument

The questionnaire is structured into four main sections representing the key constructs of the study:

**Environmental Transformational Leadership (ETL)**

Items adapted from Robertson & Barling (2013), Afsar et al. (2016), Kim et al. (2021).

Measures environmental vision, role modeling, empowerment, and intellectual stimulation.

**Employee Green Self-Efficacy (EGS)**

Adapted from Chen et al. (2014); Zhang & Dong (2024).

Assesses employees' confidence in performing environmentally responsible behaviors.

**Psychological Green Climate (PGC)**
Adapted from Norton et al. (2017).
Captures employees' perceptions of environmental support, expectations, and rewards.

**Environmental Performance (EP)**
Adapted from Gürlek & Tuna (2021); Paillé et al. (2024).
Measures eco-efficiency, waste reduction, energy conservation, and environmental compliance.
All items use a **5-point Likert scale**, consistent with the measurement format used in top-tier environmental and organizational behavior research.

### 3.4 Data Analysis
Following data collection, Structural Equation Modeling (SEM) using **Partial Least Squares (PLS-SEM)** in SmartPLS 4 will be employed to test the hypothesized relationships. PLS-SEM is particularly suitable for examining complex models involving mediation and moderation and is widely used in Elsevier, Emerald, and Springer publications (Hair et al., 2023). The analysis will involve:

**Evaluating construct reliability and validity (α, CR, AVE, HTMT)**
Assessing item loadings refined through IRT
Testing mediation effects (ETL → EGS → EP)
Testing moderation effects (EGS × PGC → EP)
Bootstrapping (5,000 resamples) for significance testing

## 4.0 Results
This study employed Partial Least Squares Structural Equation Modeling (PLS-SEM) using SmartPLS 4 to test the proposed conceptual model. PLS-SEM was deemed appropriate given the predictive orientation of the study, the inclusion of mediation and moderation effects, and its suitability for estimating complex models with moderate sample sizes (Hair, Hult, Ringle, & Sarstedt, 2022; Hair et al., 2019). The final dataset comprised 300 valid responses, exceeding the minimum recommended sample size thresholds for PLS-SEM and ensuring adequate statistical power for hypothesis testing (Hair et al., 2022; Kock & Hadaya, 2018).
Bootstrapping with **5,000 subsamples** was conducted to assess the statistical significance of the hypothesized relationships.

### 4.1 Measurement Model Assessment
**Table 4.1: Indicator Reliability (Outer Loadings)**

| Construct | Items | Outer Loadings |
|---|---|---|
| Environmental Transformational Leadership (ETL) | ETL1, ETL8 | 0.82, 0.89 |
| Employee Green Self-Efficacy (EGS) | EGS1, EGS6 | 0.83, 0.88 |
| Psychological Green Climate (PGC) | PGC1, PGC8 | 0.79, 0.87 |
| Environmental Performance (EP) | EP1, EP8 | 0.82, 0.89 |

All indicators loaded strongly on their respective constructs, with values exceeding the recommended threshold of 0.70. This confirms that each item reliably measures its intended latent variable. The absence of weak or cross-loading items indicates strong measurement quality and supports the retention of all indicators for further analysis.

**Table 4.2: Internal Consistency Reliability and Convergent Validity**

| Construct | Cronbach's α | Composite Reliability | AVE |
|---|---|---|---|
| ETL | 0.94 | 0.95 | 0.71 |
| EGS | 0.92 | 0.94 | 0.72 |
| PGC | 0.94 | 0.95 | 0.71 |

| | | | |
|---|---|---|---|
| EP | 0.94 | 0.95 | 0.72 |

Cronbach's alpha and composite reliability values for all constructs exceed the recommended cutoff of 0.70, demonstrating strong internal consistency. Additionally, AVE values are well above 0.50, indicating that each construct explains more than half of the variance in its indicators. These findings collectively confirm the **convergent validity** and reliability of the measurement model.

**Table 4.3: Discriminant Validity (HTMT Criterion)**

| Constructs | ETL | EGS | PGC | EP |
|---|---|---|---|---|
| ETL | , | | | |
| EGS | 0.65 | , | | |
| PGC | 0.39 | 0.24 | , | |
| EP | 0.57 | 0.73 | 0.18 | , |

All Heterotrait, Monotrait (HTMT) ratios are below the conservative threshold of 0.85, confirming adequate discriminant validity. This indicates that Environmental Transformational Leadership, Employee Green Self-Efficacy, Psychological Green Climate, and Environmental Performance are empirically distinct constructs and measure conceptually different phenomena.

**4.2 Structural Model Assessment**

**Table 4.4: Structural Path Coefficients**

| Hypothesis | Path | β | t-value | p-value | Result |
|---|---|---|---|---|---|
| H1 | ETL → EP | 0.19 | 4.21 | < .001 | Supported |
| H2 | ETL → EGS | 0.64 | 14.87 | < .001 | Supported |
| H3 | EGS → EP | 0.57 | 11.92 | < .001 | Supported |
| H5 | ETL × PGC → EGS | 0.29 | 6.08 | < .001 | Supported |

Environmental Transformational Leadership exhibits a strong and positive effect on Employee Green Self-Efficacy, indicating that leaders who articulate environmental vision, model pro-environmental behavior, and motivate employees significantly enhance employees' confidence in their ability to perform green tasks. Employee Green Self-Efficacy, in turn, has a strong positive effect on Environmental Performance, suggesting that employees' belief in their green capabilities is a key driver of organizational environmental outcomes. Although ETL also has a direct effect on Environmental Performance, the magnitude of this relationship is comparatively smaller, implying that leadership primarily influences performance through psychological mechanisms rather than direct control.

**Table 4.5: Coefficient of Determination ($R^2$)**

| Endogenous Construct | $R^2$ |
|---|---|
| Employee Green Self-Efficacy (EGS) | 0.45 |
| Environmental Performance (EP) | 0.49 |

The model explains approximately **45% of the variance in Employee Green Self-Efficacy** and **49% of the variance in Environmental Performance**, indicating moderate-to-substantial explanatory power. These values suggest that Environmental Transformational Leadership and Psychological Green Climate are important predictors of employees' green self-efficacy, which subsequently drives environmental performance outcomes.

**Table 4.6: Effect Size ($f^2$)**

| Relationship | $f^2$ | Effect |
|---|---|---|
| ETL → EGS | 0.64 | Large |
| EGS → EP | 0.41 | Large |
| ETL × PGC → EGS | 0.15 | Medium |
| ETL → EP | 0.04 | Small |

The large effect sizes for ETL → EGS and EGS → EP confirm that Employee Green Self-Efficacy is the dominant explanatory mechanism in the model. The moderate interaction effect demonstrates that Psychological Green Climate meaningfully strengthens the leadership, efficacy relationship. The small direct effect of ETL on Environmental Performance reinforces the argument that leadership impact is largely indirect and operates through employees' cognitive beliefs.

### 4.3 Mediation Analysis

**Table 4.7: Indirect Effects**

| Path | Indirect Effect | t-value | p-value | Mediation |
|---|---|---|---|---|
| ETL → EGS → EP | 0.37 | 9.74 | < .001 | Partial |

Employee Green Self-Efficacy significantly mediates the relationship between Environmental Transformational Leadership and Environmental Performance. The presence of partial mediation indicates that leadership enhances performance both directly and indirectly, with the indirect pathway through employee self-efficacy representing the primary mechanism. This finding aligns with Social Cognitive Theory, which posits that self-efficacy beliefs play a central role in translating leadership influence into behavioral outcomes.

### 4.4 Moderation Analysis

**Table 4.8: Moderating Effect of Psychological Green Climate**

| Interaction | β | t-value | p-value | Result |
|---|---|---|---|---|
| ETL × PGC → EGS | 0.29 | 6.08 | < .001 | Supported |

The significant interaction effect indicates that Psychological Green Climate strengthens the impact of Environmental Transformational Leadership on Employee Green Self-Efficacy. This suggests that leadership behaviors are more effective in fostering employees' green confidence when the organizational environment signals strong support for environmental values, policies, and practices.

### 4.5 Summary of Hypothesis Testing

**Table 4.9: Summary of Results**

| Hypothesis | Result |
|---|---|
| H1 | Supported |
| H2 | Supported |
| H3 | Supported |
| H4 (Mediation) | Supported |
| H5 (Moderation) | Supported |

All hypothesized direct, mediating, and moderating relationships are empirically supported, providing comprehensive validation of the proposed conceptual model.

## 5.0 DISCUSSION

This study utilized Partial Least Squares Structural Equation Modeling (PLS-SEM) via SmartPLS 4 to analyze the relationships between environmental transformational leadership (ETL), employee green self-efficacy (EGS), psychological green climate (PGC), and environmental performance (EP). Data from 300 respondents provided robust statistical power for estimating complex mediation and moderation effects, with bootstrapping of 5,000 resamples ensuring the significance of all tested paths (Hair et al., 2022; Preacher & Hayes, 2008). The measurement model demonstrated strong psychometric properties, with indicator reliability satisfied by standardized outer loadings above 0.70. Internal consistency was confirmed as Cronbach's alpha and composite reliability values surpassed 0.70, while convergent validity was established with Average Variance Extracted (AVE) values above 0.50 (Fornell & Larcker, 1981). Furthermore, discriminant validity was verified using the Heterotrait-Monotrait (HTMT) ratio, where all values remained below the 0.85 threshold, confirming adequate construct distinctiveness (Henseler et al., 2015).

The structural model results provide robust support for a framework grounded in Social Cognitive Theory. ETL exerted a significant and positive effect on EGS, indicating that leaders who communicate a clear environmental vision and serve as role models directly enhance employees' confidence in performing sustainability-related tasks (Bandura, 1997, 2001).[3] This result reinforces prior research suggesting that transformational behaviors are

essential for fostering green self-beliefs (Robertson & Barling, 2013). Similarly, EGS demonstrated a strong positive relationship with EP, confirming that employees' internal confidence translates into behaviors that improve organizational environmental outcomes (Afsar et al., 2020; Chen et al., 2022). Effect size analysis ($f^2$) revealed that while leadership has a large effect on efficacy, its direct impact on performance is comparatively small, highlighting the necessity of psychological mediators (Hair et al., 2022).

Notably, while ETL exhibited a direct positive effect on EP, this relationship was substantially weaker than the indirect effect through EGS. This suggests that leadership primarily influences environmental performance through psychological empowerment rather than direct control (Bass & Riggio, 2006; Luu, 2019). Mediation analysis confirmed that EGS partially mediates the relationship between leadership and performance. Additionally, Psychological Green Climate (PGC) was found to positively moderate the link between ETL and EGS, indicating that leadership effects are significantly amplified when organizational policies and norms actively support environmental responsibility (Norton et al., 2014; Zientara & Zamojska, 2018). Collectively, the model explains substantial variance ($R^2$) in both efficacy and performance, providing strong empirical support for the leadership-efficacy-performance pathway.

## 6. Theoretical Implications

This study makes significant theoretical contributions to the literature on ethical leadership, employee cognition, and organizational sustainability. It advances Environmental Transformational Leadership (ETL) theory by demonstrating that its influence on Environmental Performance (EP) is exerted primarily through employee-level psychological mechanisms rather than direct structural control. By identifying Employee Green Self-Efficacy (EGS) as the central mediating mechanism, the study positions self-belief as a critical micro-foundation of sustainability, extending prior research that focused largely on behavioral outcomes (Bandura, 1997; Robertson & Barling, 2013).

Furthermore, the findings enrich Social Cognitive Theory by empirically validating that employees' beliefs about their environmental capabilities are central to achieving organizational goals (Bandura, 2001; Chen et al., 2022). The discovery that ETL's direct effect is weaker than its indirect effect through EGS shifts the focus from leader-centric actions to employee-centered cognitive processes, suggesting that leadership effectiveness depends on the internalization of values (Bass & Riggio, 2006; Afsar et al., 2020). Finally, by incorporating Psychological Green Climate (PGC) as a moderator, the study identifies a crucial contextual boundary. It highlights the synergistic interaction between leadership and a supportive organizational environment, proving that leadership behaviors are most effective when reinforced by consistent cultural signals (Norton et al., 2014; Zientara & Zamojska, 2018).

## 7. Managerial Implications

This study provides actionable guidance for managers aiming to enhance environmental performance through leadership and employee empowerment. Findings indicate that environmental leadership is most effective when it strengthens employees' beliefs in their own green capabilities (Bandura, 1997, 2001). Rather than relying on directive influence, managers should implement practices that build green self-efficacy, such as targeted skills training, constructive feedback on sustainability initiatives, and formal recognition of green achievements (Robertson & Barling, 2013; Chen et al., 2015).

The central role of self-efficacy suggests that sustainability strategies must be grounded in empowerment rather than mere compliance. Organizations benefit from involving employees in environmental decision-making and experimentation, which facilitates the translation of sustainability intentions into tangible performance outcomes (Norton et al., 2017; Afsar et al., 2020). Such empowerment-oriented approaches foster an enduring commitment to organizational goals (Amjad et al., 2021).

Furthermore, the moderating influence of psychological green climate underscores the necessity of aligning leadership with

organizational systems. Managers should institutionalize environmental values through reward structures and performance appraisal criteria to ensure leadership messages are perceived as credible (Norton et al., 2014; Luu, 2019). Because leadership effectiveness is amplified in strong green climates, it should be viewed as part of a system-level approach integrating culture, empowerment, and leadership to achieve lasting environmental improvements (Singh et al., 2020).

## 8. Limitations and Future Research

Despite its contributions, this study presents limitations that offer promising avenues for future inquiry. First, the cross-sectional design restricts the ability to draw definitive causal inferences between environmental transformational leadership, green self-efficacy, and performance. Future research should employ longitudinal or time-lagged designs to better capture the temporal dynamics and directionality of these relationships (Podsakoff et al., 2012). Furthermore, while procedural and statistical remedies were implemented, the reliance on self-reported data introduces potential common method bias. Incorporating multi-source data, such as supervisor assessments or objective archival records of environmental performance, would significantly strengthen measurement validity.

The contextual scope, focused on a single institutional setting, may also limit generalizability. Replication across diverse industries and regulatory environments is necessary to assess how cultural norms and sustainability pressures influence the observed relationships. Additionally, while green self-efficacy served as the primary mediator, future studies should explore complementary psychological processes such as green intrinsic motivation or moral obligation to further unpack the micro-foundations of sustainability outcomes. Finally, transitioning from individual-level perceptions to multilevel research designs would allow for the disentanglement of organizational-level climate effects and cross-level interactions, offering a more holistic understanding of environmentally responsible behavior.

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