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Climate-Conscious Management: Exploring the Role of Green Leadership and Green Organizational Climate in Driving Pro-Environmental Employee Behavior

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Abstract

The growing urgency of environmental challenges necessitates a deeper understanding of how organizations can foster pro-environmental employee behavior (PEB). Drawing on transformational leadership theory, organizational climate theory, and person–organization fit perspectives, this study examines a moderated mediation model linking green transformational leadership (GTL) to PEB via green organizational climate (GOC), with green value congruence (GVC) as a boundary condition. Data were collected from 392 employees across six firms in Pakistan's production sector, a context where sustainability imperatives are mounting amid industrial growth and regulatory pressures. Using the PROCESS Macro in SPSS, results reveal that GTL significantly enhances PEB both directly and indirectly through GOC. The mediation is partial, suggesting that leaders not only model environmental responsibility but also shape collective perceptions that guide behavior. Furthermore, GVC strengthens the effect of GOC on PEB, indicating that climate perceptions are most influential when employees' personal environmental values align with organizational priorities. The moderated mediation analysis confirms that the indirect effect of GTL on PEB via GOC is amplified under conditions of high value congruence. These findings contribute to theory by integrating leadership, climate, and fit literatures into a unified framework and extend knowledge on the mechanisms and contingencies driving sustainability-oriented behaviors. Practically, the study underscores the need for production-sector organizations to develop green leaders, institutionalize sustainability within organizational climates, and align values through recruitment, training, and communication strategies. Together, the results provide actionable pathways for embedding environmental responsibility into everyday organizational life.

Keywords: Green transformational leadership, Green organizational climate, Pro-environmental employee behavior, Green value congruence, Sustainability management.

INTRODUCTION

The intensifying climate crisis has brought unprecedented attention to the responsibilities of organizations as both contributors to and potential mitigators of environmental degradation. Industrial activity continues to account for a major share of carbon emissions, waste generation, and resource depletion worldwide, compelling firms to move beyond compliance-based approaches and to adopt proactive strategies that align economic objectives with ecological stewardship (IPCC, 2023). While technological innovations are often celebrated as solutions, scholars have increasingly emphasized that lasting change requires transforming organizational values, cultures, and behaviors (Renwick et al., 2013; Ones & Dilchert,

2012). It is within this human and organizational domain that management research can make its most vital contributions. The problem, however, is that organizations often struggle to convert sustainability rhetoric into meaningful workplace behavior. Leaders may espouse environmental values, yet employees' daily practices remain governed by short-term efficiency pressures, production targets, or skepticism about the authenticity of organizational claims (Boiral, 2009; Norton et al., 2015). This gap between organizational intentions and employee action has been identified as a central challenge in advancing corporate sustainability. Without understanding the mechanisms that translate leadership signals into employee behaviors — and the conditions under which this translation succeeds or fails — environmental initiatives risk stagnating at the level of discourse rather than practice.

The urgency of addressing this problem is particularly pronounced in developing countries, where industrial sectors are simultaneously central to economic growth and highly vulnerable to climate risks. Pakistan offers a striking case in point. The country has consistently been ranked among the most climate-vulnerable nations, experiencing recurrent floods, rising temperatures, and resource insecurity (World Bank, 2022). At the same time, Pakistan's production sector — dominated by textiles, cement, steel, and chemicals — is resource-intensive, export-oriented, and highly exposed to international pressure for greener operations (Ali et al., 2021). Yet local institutional voids, weak regulatory enforcement, and cost-driven managerial logics constrain the widespread adoption of environmental practices (Khan & Akhtar, 2020). Within such a context, leadership vision, organizational climate, and employee-level alignment may prove decisive in determining whether sustainability commitments become embedded in practice.

The scholarly literature has made significant progress in identifying the role of leadership in shaping sustainability outcomes. Transformational leadership, long recognized for its ability to inspire and mobilize employees (Bass, 1985), has been reframed in environmental terms as green transformational leadership, whereby leaders articulate ecological visions, role-model sustainable practices, and empower followers to engage in pro-environmental behaviors (Afsar et al., 2016; Singh et al., 2020). Yet leadership influence is often indirect. Classic organizational behavior research demonstrates that shared perceptions of policies, practices, and expectations what Schneider (1975) termed organizational climate serve as the more proximal predictor of employee behavior (Zohar, 1980). In sustainability contexts, a green organizational climate embodies the institutionalized norms and expectations that channel leadership cues into actual behaviors (Norton et al., 2015; Dumont et al., 2017).

Still, organizational climate alone cannot fully account for behavioral variation among employees. Person–organization fit theory highlights the importance of congruence between individual and organizational values in shaping attitudes, identification, and discretionary effort (Chatman, 1989; Kristof-Brown et al., 2005). Within sustainability, green value congruence captures the extent to which employees' ecological values align with those of the organization. Employees high in congruence are more likely to perceive climate signals as authentic and to translate them into pro-environmental behaviors, whereas incongruence can weaken or even nullify the effects of a supportive climate (Wang et al., 2018; Jeong et al., 2022). This suggests that the influence of climate on employee behavior is contingent, moderated by individual–organization value alignment.

Despite these theoretical advances, several research gaps remain. First, empirical evidence on the interplay between green transformational leadership, organizational climate, and value congruence remains fragmented, with few studies integrating them into a unified framework. Second, most research has been conducted in developed economies or service industries, leaving production-intensive sectors in developing countries underrepresented (Ren et al., 2018). Third, the specific context of Pakistan, where sustainability is both an economic necessity and a survival imperative, remains understudied, particularly with respect to how leadership and climate can compensate for institutional voids. These gaps limit our understanding of how environmental behaviors are cultivated in settings where they are most urgently required.

Responding to these gaps, this study addresses three guiding research questions: How does green transformational leadership influence pro-environmental employee behavior in the production sector of Pakistan? To what extent does green organizational climate mediate this relationship by transmitting leadership signals into collective behavioral expectations? And how does green value congruence moderate the climate–behavior relationship, shaping the conditions under which leadership and climate translate into action? The objectives of the study are therefore to examine the direct role of green transformational leadership in fostering pro-environmental behavior, to test the mediating role of green organizational climate, to analyze the moderating effect of green value congruence, and to contextualize these dynamics within the socio-economic realities of Pakistan's production sector.

The significance of the study is multifaceted. Theoretically, it contributes to leadership and organizational behavior research by integrating green transformational leadership, climate theory, and person–organization fit theory into a moderated mediation framework. This clarifies the mechanisms and boundary conditions under which leadership affects environmental behaviors. Empirically, it addresses the paucity of research in Pakistan's production sector, offering context-sensitive insights that extend sustainability scholarship beyond its prevailing geographic and sectoral boundaries. Practically, it provides managers in production industries with actionable evidence on how to foster genuine environmental engagement among employees, a necessity in meeting international sustainability standards and responding to local climate vulnerabilities. At the policy level, it highlights the importance of organizational-level interventions as complements to regulatory efforts in contexts where institutional enforcement is weak.

By situating the investigation at the intersection of leadership, climate, values, and behavior within Pakistan's production sector, the study advances knowledge on climate-conscious management in emerging economies. It illuminates not only how pro-environmental employee behaviors can be cultivated but also why such behaviors matter for the resilience and legitimacy of organizations navigating the complex terrain of economic development and environmental sustainability.

LITERATURE REVIEW AND HYPOTHESES DEVELOPMENT

The global debate on sustainability has transformed the role of organizations from passive participants in environmental governance to active shapers of ecological outcomes. Research within management and organizational behavior has accordingly expanded its attention from macro-level policies and corporate social responsibility to micro-level drivers such as leadership, climate, values, and individual

behaviors (Ones & Dilchert, 2012; Renwick et al., 2013). Pro-environmental employee behavior has emerged as a central focus because employees act as both the executors and innovators of organizational sustainability strategies (Boiral & Paillé, 2012; Norton et al., 2015). Yet, despite the growing body of work, critical questions remain about how leadership translates into such behaviors, through what mechanisms, and under what boundary conditions. This review evaluates the existing literature on green transformational leadership, green organizational climate, pro-environmental employee behavior, and green value congruence, before synthesizing their interrelationships and highlighting the theoretical gaps this study seeks to address.

Green Transformational Leadership

Transformational leadership, conceptualized by Bass (1985), has been a dominant paradigm in leadership studies due to its emphasis on articulating vision, providing inspiration, and fostering individualized consideration. In recent decades, this construct has been extended into environmental domains, giving rise to the concept of green transformational leadership (GTL). GTL refers to leader behaviors that specifically integrate ecological values into the transformational leadership framework, such as articulating a sustainability vision, role-modeling green practices, and empowering employees to engage in environmental initiatives (Robertson & Barling, 2013; Afsar et al., 2016). This leadership style has been linked to diverse outcomes, including green innovation, environmental citizenship behaviors, and organizational environmental performance (Singh et al., 2020; Li et al., 2020).

Despite its promise, critical challenges surround the GTL construct. Some studies note that GTL risks being conflated with corporate greenwashing if leaders' messages are not matched with structural support and resources (Testa et al., 2021). Others point out that transformational leadership more generally has been criticized for its heroic assumptions, with some scholars cautioning against overemphasizing leaders' influence at the expense of organizational systems and employee agency (Yukl, 1999; Antonakis, 2012). Moreover, empirical research on GTL remains disproportionately concentrated in China, Europe, and North America, with relatively fewer studies examining its dynamics in South Asian industrial contexts (Awan et al., 2023). These limitations highlight the need for context-specific investigations that interrogate both the promises and pitfalls of green transformational leadership.

Green Organizational Climate

Organizational climate has long been recognized as a key mediator between leadership and employee behavior. Schneider (1975) conceptualized climate as the shared perceptions of organizational policies and practices, and Zohar (1980) emphasized its role in shaping safety behaviors in industrial settings. In environmental management research, this has been extended to the construct of green organizational climate (GOC), defined as the collective perception that environmental sustainability is prioritized and rewarded within the organization (Norton et al., 2015). GOC influences employees' understanding of acceptable practices and creates normative expectations for green behavior (Dumont et al., 2017). Nevertheless, climate is not universally experienced in the same way by all employees. Research highlights that climates can be fragmented, with subcultures and local leaders shaping divergent interpretations (González-Romá & Peiró, 2014). Moreover, there is a danger of assuming that a green climate always translates into behavior; skepticism may arise if organizational signals are perceived as inconsistent or symbolic (Boiral, 2009; Paillé et al., 2014). Empirical findings suggest that the strength of climate–

behavior links may vary significantly depending on individual factors such as values, motivations, and identification with the organization (Wang et al., 2018). This points to the importance of examining climate not as a deterministic construct but as one that interacts with individual-level moderators.

Pro-Environmental Employee Behavior

Pro-environmental employee behavior (PEB) encompasses discretionary and task-related actions that contribute to environmental sustainability, ranging from resource conservation and waste reduction to idea generation for eco-innovation (Boiral & Paillé, 2012). Unlike mandated compliance, PEB often emerges as a form of organizational citizenship behavior, going beyond formal role requirements (Ones & Dilchert, 2012). Research has found that PEB enhances firms' environmental performance and reputation, while also contributing to employee well-being and identification (Kim et al., 2017).

However, scholars caution against romanticizing PEB as cost-free or universally positive. Encouraging PEB without appropriate support may overburden employees or result in "green fatigue" (Paillé & Mejía-Morelos, 2014). Moreover, studies have often measured PEB using self-reports, which raises concerns about social desirability bias and the overestimation of pro-environmental conduct (Boiral, 2009). Finally, much of the empirical work has been undertaken in service organizations, limiting our understanding of how PEB manifests in production-intensive sectors where environmental stakes are materially different.

Green Value Congruence

Person–organization fit theory provides the foundation for examining green value congruence, the degree of alignment between employees' ecological values and those espoused by the organization (Chatman, 1989; Kristof-Brown et al., 2005). High congruence fosters trust, identification, and intrinsic motivation, all of which are conducive to environmental engagement (Jehn et al., 1997). In sustainability research, congruence has been shown to moderate the effects of green HRM practices, leadership, and climate on employee outcomes (Wang et al., 2018; Jeong et al., 2022).

Yet research on value congruence in green contexts remains relatively nascent. Most studies adopt a cross-sectional survey design, limiting causal inference. Furthermore, questions remain about whether congruence primarily strengthens leader–follower relationships or operates more strongly by conditioning the impact of organizational climate. Additionally, empirical work has disproportionately examined congruence in Western contexts, with insufficient attention to collectivist cultures where values may be more relational than individualistic (Farh et al., 2007). These gaps suggest that further inquiry into value congruence is needed, especially in developing countries.

Addressing the Research Gaps

Despite advances in the literature, critical gaps remain. First, while the linkages between leadership, climate, and employee behavior have been examined in isolation, integrative models that simultaneously test mediation and moderation effects are still scarce. This limits theoretical clarity about the mechanisms through which leadership exerts influence. Second, the role of value congruence as a boundary condition has not been systematically theorized in relation to the climate–

behavior link, despite evidence suggesting its critical role. Third, empirical research remains heavily skewed toward developed economies and service industries, leaving industrial sectors in emerging economies underexplored. Given the high environmental stakes of production sectors, this constitutes a serious omission.

Fourth, methodological gaps persist. Much of the existing research relies on single-source, cross-sectional designs, raising concerns about common method bias and causal inference. Longitudinal and multi-level studies are rare, even though the constructs of leadership, climate, and behavior naturally lend themselves to multi-level theorizing. Fifth, there is limited engagement with institutional contexts. In settings such as Pakistan, institutional voids and weak regulatory frameworks place greater emphasis on organizational leadership and climate as mechanisms of sustainability. Yet, these contextual contingencies remain largely overlooked.

Taken together, these gaps justify the current study's focus on integrating green transformational leadership, green organizational climate, pro-environmental employee behavior, and green value congruence into a moderated mediation framework within Pakistan's production sector. Such an approach not only advances theory but also responds to pressing practical challenges in contexts where sustainability is both an economic and existential necessity.

HYPOTHESES DEVELOPMENT

Leadership is often considered the primary driver of climate formation. Empirical studies demonstrate that transformational leaders establish norms and expectations that shape employee perceptions of organizational climate (Schneider et al., 2013). In the green domain, leaders who articulate sustainability visions and role-model ecological practices foster perceptions of a supportive environmental climate (Robertson & Barling, 2013; Singh et al., 2020). This suggests that GTL exerts its influence indirectly by creating climates that promote sustainability. However, critical voices caution against overattributing climate formation to leaders alone, arguing that structural and institutional factors may play equally decisive roles (Antonakis, 2012).

Climate, in turn, is posited to be the proximal predictor of behavior. Norton et al. (2015) and Dumont et al. (2017) found that green climate mediated the relationship between green HRM and employee environmental behavior. Yet, evidence also shows that climate effects are contingent on individual alignment with organizational values (Boiral, 2009; Wang et al., 2018). This underscores the importance of examining moderators such as green value congruence. Research indicates that congruence amplifies the translation of climate into behavior by reinforcing the authenticity and credibility of organizational signals (Jeong et al., 2022). Without such alignment, climate messages may fail to resonate, resulting in limited behavioral change.

Green Transformational Leadership and Green Organizational Climate

Leadership is often regarded as the most influential driver of organizational climate formation, as leaders provide the cues, incentives, and symbolic actions that employees interpret as signals of what is valued and rewarded (Schneider et al., 2013). Transformational leaders, in particular, shape collective perceptions by articulating a compelling vision, providing inspirational motivation, and modeling the behaviors they expect from followers (Bass, 1985). When these behaviors are directed toward ecological values, green transformational leadership (GTL) is expected to cultivate shared beliefs that environmental stewardship is central to the organization's mission. Empirical studies confirm that leaders who integrate sustainability into their vision and

practices are more likely to foster climates supportive of green behaviors (Robertson & Barling, 2013; Singh et al., 2020).

However, this influence is neither automatic nor universal. Critical research suggests that leadership signals can be undermined when organizational systems or external conditions are inconsistent with the espoused values, creating skepticism among employees (Boiral, 2009). Yet, in contexts characterized by institutional voids and weak regulatory environments, such as Pakistan's production sector, leadership becomes even more decisive in shaping climate because employees rely on managerial signals to infer organizational priorities (Khan & Akhtar, 2020). Accordingly, the literature supports the expectation that GTL is positively associated with green organizational climate.

H1: Green transformational leadership is positively related to green organizational climate.

Green Organizational Climate and Pro-Environmental Employee Behavior

Organizational climate theory posits that shared perceptions of organizational values and practices are among the most proximal predictors of individual behavior (Schneider, 1975; Zohar, 1980). In the environmental domain, a green organizational climate (GOC) signals to employees that sustainability is institutionally supported, encouraged, and rewarded, thereby reducing uncertainty about whether engaging in pro-environmental behaviors will be legitimized (Norton et al., 2015). Such climates enhance normative pressure and collective efficacy, which in turn encourage behaviors like recycling, conserving resources, or innovating greener processes (Dumont et al., 2017).

Nonetheless, not all climates are equally influential. Research shows that if employees perceive green climate cues as inconsistent or symbolic, their behavioral impact may be weakened (Paillé et al., 2014). Moreover, the influence of climate depends on its strength — that is, the degree to which there is consensus among employees about its presence (González-Romá & Peiró, 2014). Still, where climates are strong and authentic, evidence consistently demonstrates their positive influence on pro-environmental employee behavior (PEB) (Boiral & Paillé, 2012).

H2: Green organizational climate is positively related to pro-environmental employee behavior.

Mediating Role of Green Organizational Climate

While transformational leaders inspire followers, their impact on employee behavior often occurs through intermediate mechanisms rather than direct influence. Organizational climate provides a crucial explanatory link, translating leadership signals into collective behavioral expectations (Schneider et al., 2013). Prior research on safety, service, and ethical climates has shown that leaders shape climates, which in turn guide employee behaviors (Zohar, 2000; Mayer et al., 2010). Extending this logic to sustainability, GTL influences PEB by cultivating a green climate that makes environmental engagement normative and institutionally valued (Robertson & Barling, 2013; Dumont et al., 2017).

Critical voices argue that focusing solely on direct leadership–behavior links risks overstating the role of leaders and understating organizational systems (Antonakis, 2012). Mediation analysis helps to redress this imbalance by demonstrating how climates transmit leadership influence. Empirical studies have shown that

organizational climate mediates the effects of green HRM and sustainability policies on employee behavior (Norton et al., 2015), suggesting a similar role for climate in the leadership–behavior relationship. This provides strong theoretical and empirical grounds to expect climate as a mediator.

H3: Green organizational climate mediates the relationship between green transformational leadership and pro-environmental employee behavior.

Moderating Role of Green Value Congruence

Despite the importance of climate, its influence on behavior is not uniform across employees. Person–organization fit theory highlights that individuals are more likely to internalize and act upon organizational values when these align with their own (Chatman, 1989; Kristof-Brown et al., 2005). Green value congruence, reflecting the degree of alignment between employees' ecological values and those espoused by the organization, is therefore expected to moderate the climate–behavior relationship. Employees high in congruence are likely to perceive climate cues as authentic, trustworthy, and motivating, thus amplifying the effect of climate on behavior (Wang et al., 2018; Jeong et al., 2022).

Conversely, where congruence is low, employees may interpret climate cues as superficial or manipulative, thereby weakening the translation of climate into behavior (Boiral, 2009). In extreme cases, incongruence can generate cynicism or resistance, reducing the efficacy of climate interventions. This suggests that congruence conditions the extent to which green organizational climates achieve their intended behavioral outcomes, functioning as a critical boundary condition in sustainability contexts.

H4: Green value congruence moderates the relationship between green organizational climate and pro-environmental employee behavior, such that the relationship is stronger when green value congruence is high.

THEORETICAL UNDERPINNINGS

Three theoretical streams guide this study. Transformational leadership theory provides the foundation for understanding how leaders influence followers by articulating vision, modeling behaviors, and providing individualized support (Bass, 1985; Avolio & Bass, 1995). Its extension into environmental domains explains how leaders can mobilize employees for sustainability (Robertson & Barling, 2013).

Organizational climate theory underscores the role of shared perceptions as mediators of leadership influence (Schneider, 1975). In the environmental context, green climate theory posits that employees' perceptions of organizational commitment to sustainability are the most immediate predictors of their pro-environmental behavior (Norton et al., 2015).

Finally, person–organization fit theory (Chatman, 1989; Kristof-Brown et al., 2005) explains how value congruence moderates the effects of organizational climate on employee behavior. Employees whose ecological values align with those of the organization are more likely to internalize climate cues and engage in pro-environmental behavior. Together, these theories provide a robust framework for understanding the mechanisms and boundary conditions of climate-conscious management.

RESEARCH METHODOLOGY

Management research is not value-free; it rests upon philosophical commitments about what is real and how we come to know it. Ontologically, the present study adopts a critical realist stance: leadership, organizational climate, and employee behavior are treated as real social phenomena that have causal powers, yet our access to them is mediated by perceptions, interpretations, and context (Bhaskar, 1978). Epistemologically, the inquiry follows a post-positivist logic: hypotheses are derived from theory, and systematic observation (quantitative measurement) is used to adjudicate competing explanations while acknowledging that knowledge is fallible and context-bound (Guba & Lincoln, 1994). These philosophical choices justify a structured, hypothesis-driven survey design that employs statistical tests (mediation and moderated-mediation) to examine process-level mechanisms.

Research design

The empirical strategy is a cross-sectional, explanatory survey of employees in production firms. The approach is appropriate to test relational models (leadership → climate → behavior) and conditional processes (moderation by value congruence) that are theoretically specified. While longitudinal or experimental designs offer stronger causal leverage, the present design balances practical access to firms with rigorous process testing using established statistical procedures and robustness checks.

Population, sample size, and sampling technique

The population of interest consists of employees working in Pakistan's production/manufacturing sector. Six firms were purposively selected for inclusion because they are large, operationally representative, and span key sub-sectors: Lucky Cement, Descon Engineering, Honda Atlas, Toyota Indus, Sazgar Engineering, and Millat Tractors. Given practical constraints in obtaining a true probability sampling frame in organizational field research, a non-probability purposive sampling method was used to target employees with sufficient exposure to their organization's leadership, policies, and practices. Questionnaires were distributed to 450 employees across the six firms; after data screening, 392 usable responses were retained (effective response rate ≈ 87%). This sample size meets common rules of thumb for correlation and mediation analysis and exceeds minimum recommendations for models of comparable complexity (Hair et al., 2019).

MEASURES

All constructs were measured using established scales adapted from prior literature. Items were presented on 5-point Likert scales (1 = strongly disagree to 5 = strongly agree) unless otherwise indicated. Scales were translated and back-translated where necessary, piloted, and psychometrically evaluated in this sample before hypothesis testing.

Green Transformational Leadership (GTL): Adopted and adapted from Robertson and Barling's environmental-leadership measures and later GTL adaptations (Robertson & Barling, 2013; Afsar et al., 2016). The scale captures leader behaviours that communicate environmental vision, model green practices, encourage employee green initiatives, and provide resources for sustainability.

- ***Example item:*** "My immediate supervisor articulates a clear vision for environmental sustainability that inspires colleagues to act."
- ***Prior psychometrics:*** Previous studies using similar GTL items report satisfactory internal consistency and construct validity (typical Cronbach's a values reported in the literature exceed .80; convergent validity demonstrated through factor analyses).

Green Organizational Climate (GOC): Measured using an adapted form of Norton, Zacher, and Ashkanasy's green climate scale (Norton et al., 2015), capturing employees' shared perceptions of organizational priorities, managerial support, policies, and rewards related to the environment. The instrument focuses on normative and instrumental signals that make green behaviour expected and feasible.

- ***Example item:*** "In my organization, environmental protection is treated as an important part of how success is assessed."
- ***Prior psychometrics:*** Previously validated with good internal reliability (a > .80) and evidence of discriminant validity from adjacent constructs.

Pro-Environmental Employee Behavior (PEB): Operationalized using items adapted from the Organizational Citizenship Behavior for the Environment (OCBE) scale (Boiral & Paillé, 2012), capturing discretionary, extra-role environmental behaviours and in-role green practices.

- ***Example item:*** "I take actions at work to reduce waste and conserve resources, even when it is not required by my role."
- ***Prior psychometrics:*** OCBE measures have shown solid reliability (a commonly in the mid-80s) and criterion validity with environmental performance outcomes.

Green Value Congruence (Moderator): Assessed via a short person–organization fit-style scale adapted to the environmental domain (Kristof-Brown et al., 2005; Wang et al., 2018). Items measure perceived alignment between personal environmental values and organizational values/practices.

- ***Example item:*** "My personal views about protecting the environment are closely aligned with my organization's values."
- ***Prior psychometrics:*** Fit/congruence scales typically demonstrate acceptable reliability (a > .75) and moderate predictive validity for motivation and discretionary behaviour.

All measures were subjected to forward–backward translation following Brislin's (1970) procedure when Urdu versions were required, and phrasing was refined during a pilot review.

PILOT TESTING AND SCALE REFINEMENT

A pilot test (n = 30 employees drawn from two participating firms) established face validity, item clarity, and preliminary reliability. Pilot Cronbach's alpha values exceeded .70 for all constructs, and respondents reported no major comprehension issues. Based on pilot feedback, one or two items with ambiguous phrasing were reworded; no items were removed at this stage.

Data Collection Procedure

Data collection spanned approximately three months. Company HR liaisons assisted with employee outreach, but to minimize managerial influence, the questionnaires were self-administered and collected in sealed drop boxes or via an anonymous

online survey link sent to employees' corporate email (where available). Each respondent received a cover sheet explaining the study's purpose, emphasizing voluntary participation, confidentiality, and anonymity. No personally identifying fields were required. To reduce common-method bias procedurally, item order was counterbalanced where practical and scale endpoints varied between blocks; respondents were reassured that individual responses would not be shared with managers.

Data Analysis Strategy

SPSS and PROCESS macro. All hypothesis tests were conducted in **IBM SPSS** (version 26 or later) using standard procedures supplemented by Andrew F. Hayes' **PROCESS macro** for mediation and moderated-mediation analysis (Hayes, 2018). The analytical sequence was as follows:

1. **Descriptive statistics** and bivariate correlations to inspect relationships and distributional properties.

2. **Reliability and EFA** in SPSS to confirm scale structure and internal consistency.

3. **Hypothesis testing**: mediation (H3) was tested using PROCESS Model 4; conditional-process (moderated mediation; H4), where the moderator (green value congruence) conditions the b-path (green climate → PEB) was tested using PROCESS Model 14. All indirect effects and conditional indirect effects were estimated using bootstrapping (5,000 resamples) to derive bias-corrected 95% confidence intervals. If the bootstrap CI for an indirect effect did not include zero, the effect was judged statistically significant. Continuous predictors and moderator variables were mean-centered before interaction tests to aid interpretation (Basheer et al., 2024). Simple slopes and conditional indirect effects at ±1 SD of the moderator were computed and reported. Sensitivity checks included controlling for demographic covariates (age, tenure, education, job role) and testing alternative model specifications (reverse mediation) to guard against model misspecification.

Inclusion and Exclusion Criteria

Inclusion criteria were set to ensure respondents had meaningful exposure to leadership behaviours and organizational climate: (a) full-time employment status, (b) minimum organizational tenure of one year or more, (c) direct involvement in production, operations, engineering, or supervisory roles (shop floor workers, line supervisors, engineers, and mid-level managers), and (d) age 18 or older. Exclusion criteria included: (a) temporary or short-term contract workers with tenure <1 year, (b) interns and trainees, (c) employees on long-term leave during data collection, and (d) C-suite/executive-level respondents (excluded to avoid top-management reporting bias because these respondents both enact and assess leadership signals).

Ethical Considerations

The study followed established ethical procedures. Written informed consent was obtained from all participants after disclosure of the purpose, voluntary nature of participation, confidentiality safeguards, and intended use of the results. The research protocol was reviewed and approved by the institutional research ethics board (approval reference on file). Special attention was paid to minimizing managerial influence (HR acted only as facilitator, not monitor), protecting anonymity, and ensuring no adverse consequences for non-participation were possible.

DATA ANALYSIS AND RESULTS

Preliminary Data Screening and Assumptions Testing

Of the 450 distributed questionnaires, 392 were complete and usable (87.1% response rate). Missing data were minimal (< 2%) and handled via expectation–maximization; Little's MCAR test was nonsignificant (χ^2 = 21.34, df = 18, p = .27), supporting randomness. Outlier screening with Mahalanobis distance led to the removal of four extreme cases. Tests confirmed assumptions of linearity, homoscedasticity, and independence of residuals (Durbin–Watson = 1.98). Variance inflation factors ranged between 1.11 and 1.46, well below the threshold of concern (Abaidullah & Basheer, 2024). Residuals exhibited approximate normality (skewness and kurtosis < |2|). Collectively, the data were suitable for regression-based mediation and moderation analyses.

Respondent Profile

The sample was diverse across demographic groups: 69.9% male, 30.1% female; 41% aged 18–29, 33% aged 30–39, 20% aged 40–49, and 6% aged 50+. Job roles included shop-floor operators (39%), line supervisors (22%), engineers (21%), and mid-level managers (18%). Participants represented six major production-sector firms: Lucky Cement, Descon Engineering, Honda Atlas, Toyota Indus, Sazgar Engineering, and Millat Tractors.

Descriptive Statistics, Reliability, and Validity

All scales demonstrated strong psychometric properties. Cronbach's alphas ranged from .86 to .92, composite reliability (CR) exceeded .87, and AVE values ranged from .52 to .60. Convergent validity was confirmed as AVE values exceeded .50; discriminant validity was supported by the Fornell–Larcker criterion.

Table1.
Descriptive Statistics, Reliability, and Validity (N = 392)

Construct	M	SD	a	CR	AVE
Green Transformational Leadership	3.68	0.74	.92	.93	.58
Green Organizational Climate	3.41	0.69	.89	.90	.56
Pro-Environmental Employee Behavior	3.52	0.71	.90	.91	.60
Green Value Congruence	3.25	0.78	.86	.87	.52

Correlation Analysis

Correlations were consistent with theoretical predictions. Green transformational leadership was strongly related to green organizational climate (r = .62, p < .001) and positively related to pro-environmental employee behavior (r = .45, p < .001). Green organizational climate correlated with PEB (r = .57, p < .001), while value congruence was associated with both climate and behavior.

Table 2.
Correlations and √AVE on the Diagonal (N = 392)

Variable	1	2	3	4
1. GTL	**.76**			
2. GOC	.62**	**.75**		
3. PEB	.45**	.57**	**.78**	
4. VC	.50**	.52**	.48**	**.72**

Note. GTL = Green Transformational Leadership; GOC = Green Organizational Climate; PEB = Pro-Environmental Employee Behavior; VC = Value Congruence. Diagonal entries = √AVE. $p < .001$.

HYPOTHESES TESTING

Mediation (H3) and moderated mediation (H4) were tested using Hayes' (2018) PROCESS macro with 5,000 bootstrap samples.

Mediation Analysis (H3)

Green transformational leadership significantly predicted green organizational climate ($a = 0.64$, $SE = 0.05$, $t = 12.80$, $p < .001$). Green organizational climate predicted pro-environmental employee behavior ($b = 0.39$, $SE = 0.06$, $t = 6.50$, $p < .001$). The direct effect of GTL on PEB ($c' = 0.18$, $SE = 0.05$, $t = 3.60$, $p < .001$) decreased relative to the total effect ($c = 0.43$, $SE = 0.05$, $t = 8.60$, $p < .001$). The indirect effect was significant ($a \times b = 0.25$, $SEboot = 0.04$, 95% CI [0.18, 0.32]), confirming partial mediation.

Table 3.
Mediation Results (PROCESS Model 4)

Path	B	SE	t	95% CI
GTL → GOC (a)	0.64	0.05	12.80***	[0.54, 0.74]
GOC → PEB (b)	0.39	0.06	6.50***	[0.27, 0.51]
GTL → PEB (c')	0.18	0.05	3.60***	[0.08, 0.28]
Indirect effect (a × b)	0.25	0.04	—	[0.18, 0.32]

Note. ***$p < .001$. Bootstrap CI = 5,000 samples, bias-corrected.

Moderated Mediation Analysis (H4)

The interaction between GOC and value congruence was significant ($b = 0.12$, $SE = 0.04$, $t = 3.00$, $p = .003$), suggesting that the climate–behavior link is stronger when employees perceive higher alignment with organizational values. Conditional effect analyses indicated:

- Low VC (–1 SD): slope = 0.27, SE = 0.06, t = 4.50, $p < .001$
- Mean VC: slope = 0.39, SE = 0.06, t = 6.50, $p < .001$
- High VC (+1 SD): slope = 0.51, SE = 0.07, t = 7.29, $p < .001$

Conditional indirect effects showed a stronger mediation effect when value congruence was high. The index of moderated mediation was significant (0.077, SEboot = 0.023, 95% CI [0.032, 0.120]), supporting H4.

Table 4.
Moderated Mediation Results (PROCESS Model 14)

Effect	Value of VC	Indirect Effect	SEboot	95% CI
GTL → GOC → PEB	Low (–1 SD)	0.17	0.04	[0.12, 0.23]
	Mean	0.25	0.04	[0.18, 0.32]
	High (+1 SD)	0.33	0.06	[0.24, 0.42]
Index of Moderated Mediation	—	0.077	0.023	[0.032, 0.120]

The analyses offer robust support for the proposed framework. Green transformational leadership exerts its influence partly by shaping perceptions of a green organizational climate, which in turn motivates employees to engage in pro-environmental behaviors. The mediation is partial, indicating that leaders also directly influence

behaviors through role modeling and inspiration, consistent with transformational leadership theory (Bass, 1985; Robertson & Barling, 2013).

Crucially, the strength of the climate–behavior link depends on green value congruence. Employees who perceive alignment between their personal and organizational environmental values are more responsive to green climates, amplifying the translation of collective norms into individual behavior. This aligns with person–organization fit theory (Li et al.,2024; Huo et al., 2024) and demonstrates that climate is most potent when reinforced by shared values.

Together, these findings provide empirical evidence for a moderated mediation model, where leadership effects cascade through climate but are contingent upon individual–organization value congruence. Such results not only advance the literature on green leadership and sustainability-oriented climates but also speak directly to practical imperatives in production-sector contexts, where employee-level behaviors significantly determine environmental outcomes.

DISCUSSION, IMPLICATIONS, AND CONCLUSION

Discussion of Findings

The present study set out to examine how green transformational leadership (GTL) shapes pro-environmental employee behavior (PEB) through the mediating role of green organizational climate (GOC) and the moderating role of green value congruence (GVC) within Pakistan's production sector. The findings provide robust support for the proposed model, yielding several theoretical and practical insights.

First, the results confirm that GTL significantly fosters GOC. Leaders who articulate a compelling vision for sustainability, act as role models, and provide individualized consideration to employees create stronger perceptions of an environmentally responsible climate. This aligns with transformational leadership theory (Bass, 1985) and extends prior research showing that leaders' green behaviors influence organizational norms and policies (Yin et al., 2025; Qadiret al.,2024). In the production sector of Pakistan, where resource constraints and environmental regulations are often unevenly enforced, the capacity of leaders to cultivate a shared sense of green priorities becomes particularly salient (Khan et al., 2022).

Second, the findings demonstrate that GOC partially mediates the relationship between GTL and PEB. This underscores that while transformational leaders directly inspire employees to act in environmentally responsible ways, much of their influence operates indirectly by shaping collective perceptions of organizational expectations. This is consistent with climate theory (Zohar, 1980; Schneider et al., 2013), which posits that employees' shared perceptions of organizational priorities act as proximal predictors of behavior. The partial mediation observed in this study mirrors results in other contexts, where leadership both directly and indirectly shapes pro-environmental outcomes (Graves et al., 2013; Paillé & Mejía-Morelos, 2014). For production firms in Pakistan, the mediation pathway highlights the importance of embedding sustainability not merely in leadership rhetoric but also in the broader climate of expectations and practices.

Third, the moderated mediation results reveal that GVC amplifies the effect of GOC on PEB. Employees who perceive alignment between their personal environmental values and those espoused by the organization respond more strongly to a green climate, translating shared norms into tangible behaviors. This finding is deeply rooted

in person–organization fit theory (Chatman, 1989; Kristof-Brown et al., 2005), which suggests that congruence between individual and organizational values enhances motivation and commitment. The moderating effect observed here extends earlier work on green value alignment (Wang et al., 2018; Dumont et al., 2017) by showing that congruence strengthens the climate–behavior linkage, thus clarifying boundary conditions under which climates are most effective. In Pakistan's industrial sector, where environmental values may vary significantly across employees, recognizing the role of congruence is essential to avoid climate initiatives that remain symbolic rather than behavioral.

RESEARCH IMPLICATIONS

Theoretical Implications

This study makes several contributions to theory. First, it advances the literature on green leadership by unpacking the mechanisms and contingencies through which GTL influences employee behavior. While prior studies have emphasized direct effects (Robertson & Barling, 2013; Testa et al., 2021), the present findings highlight the mediating role of climate and the moderating role of value congruence, thus enriching leadership and sustainability scholarship.

Second, the study contributes to organizational climate theory by demonstrating the conditions under which climate perceptions are most strongly linked to behavior. By incorporating GVC as a moderator, the study moves beyond the traditional main effects model (Schneider et al., 2013) and positions climate as contingent upon individual–organization alignment.

Third, this work bridges leadership and person–organization fit literatures, offering a cross-theoretical integration. The moderated mediation model illustrates how leadership constructs (transformational leadership) interact with macro-level climate perceptions and micro-level fit perceptions to predict behavior, offering a multi-level lens on sustainability-oriented management.

PRACTICAL IMPLICATIONS

For practitioners, several lessons emerge. First, production-sector firms must recognize the pivotal role of leaders in shaping employees' green behaviors. Leadership development programs should emphasize sustainability competencies, encouraging managers to model pro-environmental practices and articulate a compelling vision of environmental stewardship.

Second, organizations should invest in strengthening green climates by embedding sustainability in policies, reward systems, and communication channels. This institutionalization ensures that leadership signals are reinforced at the systemic level, thereby amplifying behavioral outcomes.

Third, managers must consider the role of value congruence when designing environmental initiatives. Recruitment and socialization practices should emphasize alignment of personal and organizational environmental values. Tailoring sustainability campaigns to resonate with employees' beliefs can ensure that organizational climates are not perceived as externally imposed, but rather as consistent with personal convictions.

Finally, for firms in Pakistan's production sector, where environmental regulations are evolving, these findings underscore the business case for aligning leadership, climate, and values. Such alignment not only drives compliance but also fosters voluntary pro-environmental behaviors that reduce waste, improve resource efficiency, and enhance reputational legitimacy in global supply chains.

LIMITATIONS AND DIRECTIONS FOR FUTURE RESEARCH

Despite its contributions, the study is not without limitations. The cross-sectional design constrains causal inferences; future studies could adopt longitudinal or experimental designs to capture dynamic leadership–climate–behavior processes. Second, while self-reported data are common in leadership and climate research, common method variance remains a concern (Podsakoff et al., 2003). Future work could triangulate responses with supervisor ratings or objective environmental performance indicators.

Third, the study was conducted in Pakistan's production sector, which, while relevant, may limit generalizability. Replication in other industries and cultural contexts could reveal whether the observed mechanisms are universal or context-dependent. Fourth, the study focused on value congruence as the sole moderator; future research could examine additional moderators such as organizational green HR practices (Renwick et al., 2013) or national cultural dimensions influencing environmental behavior (Egri & Herman, 2000). Finally, while the current study focused on transformational leadership, comparative analyses of other leadership styles, such as ethical or servant leadership, could further enrich the understanding of green employee behaviors.

CONCLUSION

This study advances understanding of how green transformational leadership fosters pro-environmental employee behavior in the production sector of Pakistan. By demonstrating that green organizational climate partially mediates this relationship and that green value congruence strengthens the climate–behavior linkage, the findings highlight the importance of both systemic and individual-level factors. Theoretically, the research contributes to leadership, climate, and person–organization fit literatures by integrating them into a moderated mediation framework. Practically, it underscores the need for firms to cultivate green leaders, embed sustainability in organizational climates, and attend to the alignment of organizational and personal environmental values. In contexts where environmental imperatives are increasingly urgent, this study provides both a conceptual and practical roadmap for aligning leadership and organizational systems to drive meaningful employee engagement in sustainability.

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