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Fostering employee's pro-environmental behavior through green transformational leadership, green human resource management and environmental knowledge

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ABSTRACT

The study examines the role of green transformational leadership (GTL) in fostering pro-environmental behaviors (PEBs) through green human resource management (GHRM). In addition, a moderating role of environmental knowledge is also investigated. The partial least squares structural equation modeling (PLS-SEM) technique is employed to test the hypothesized relationships. The findings revealed the significance of GTL in predicting employees' PEBs through the mediating role of GHRM. Further, the moderating role of environmental knowledge is also confirmed. This study presents a thorough and synergistic comprehension of the process through which PEBs can be promoted. In doing so, the study offers a deeper understanding of the interconnected mechanisms that promote PEBs and eventually guide organizational practice.

1. Introduction

Climate change is a serious global issue. As per Inter-Governmental Panel on Climate Change, between 1980 and 2012, there was a 0.85-degree Celsius rise in temperature, which had a negative impact on total grain yields (as a 1.8C increase in the temperature reduces 5 percent yield) (Islam *et al.*, 2021). In addition, between 1981 and 2002, the warm climate resulted in a 40-megaton decline in wheat, maize, and other crops. The loss of polar ice has resulted in a 19-centimeter rise in sea level due to the warm weather (Islam *et al.*, 2021). According to studies, greenhouse gas emission has seen a sharp increase between 2000-2010, and if this emission continues at the current rate, there might be an increase of 1.5 degrees Celsius in temperature by the end of the century. According to the World health organization, climate change causes over 150,000 deaths annually (WHO, 2022), and it is expected to cause 250,000 additional deaths per year between 2030-2050 (WHO, 2021).

In recent research, organizations have been held accountable for climate change as they continue to emit carbon dioxide and harmful chemicals into the air and water (Robertson and Barling, 2017). Therefore, environmental activists and scientists expect organizations to implement green and sustainable practices. Implementation of such strategic practices depends on organizational leaders (Peng *et al.*, 2021). The significance of organizational leaders in influencing employees' and organizational outcomes is well documented in the literature (Hannah *et al.*, 2008). Therefore, a number of scholars began to explore environmental leadership. Former studies instanced the characteristics of an effective leader in the environmental sector, while recent scholars attempted to probe the influence of leadership behaviors (Afsar *et al.*, 2016). Out of many leadership models and theories, transformational leadership theory is pertinent for the comprehension of environmental management, as transformational leaders are seen to be more effective in enhancing environmental performance (Peng *et al.*, 2021). In line with this theme, Robertson and Barling (2013: 177) introduced green specific transformational leadership (GTL). GTL is defined as "a manifestation of transformational leadership in which content of the leadership is all focused to encourage pro-environmental and green initiatives." Literature shows enough evidence that GTL facilitates PEBs (Peng *et al.*, 2021).

The literature suggests the significance of employees' workplace pro-environment behaviors (PEBs) in enhancing an organization's environmental performance (Li *et al.*, 2020). Employees' realization of the

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importance and seriousness of environmental issues can better respond to such challenges by performing pro-environment actions, with the goal to minimize resource wastage and save operational costs. Given these widespread impacts, it's no surprise that numerous scholars have identified and advocated for empirical studies to investigate employees' PEBs at the workplace (Shah *et al.*, 2021). However, limited studies probed the determinants of PEBs in the Pakistani context, where issues and challenges related to the environment are particularly salient to firms today. To fill this gap, we developed and tested a framework that proposes that organizations' green objectives can be achieved through leadership and human resource management practices.

Therefore, the study's objective is to examine the direct effect of GTL on PEBs and then the indirect mechanism by which GTL can affect PEBs. In this regard, the current study investigates the mediating role of green human resource practices (GHRM) in the relationship between GTL and PEBs. Scholars defined GHRM as human resource management activities that contribute to environmental management (Ansari *et al.*, 2020; Renwick *et al.*, 2016). It is suggested that employees' awareness and commitment to environmental protection and preservation increases as the firm adopts the GHRM activities (Pham *et al.*, 2019). Furthermore, we believe that the impact of GHRM on PEBs may be more substantial if the employees are aware of environmental issues and consequences. Thus, this research examines a mechanism through which employees' environmental knowledge (EK) intervene in the GHRM-PEBs link.

In so doing, this study contributes in several ways. First, the current study adds to the knowledge base by examining the effects of GTL and GHRM on behavioral outcomes of employees in the workplace, which has lacked empirical studies and therefore requires more scholarly attention. Furthermore, the literature on GHRM is still emerging, and its impact on employee outcomes is still in the infancy stage (Pham *et al.*, 2020).

Second, a thorough comprehension is indispensable in understanding the process through which employees' green behavior can be influenced, as still there is a lack of agreement on the mechanisms (Dumont *et al.*, 2017). To fill this research gap, the authors looked into the role of green GHRM in mediating the relationship between GTL and PEBs. Despite initial research on the internal mechanism of GTL predicting employees' PEBs, further theorizing and research are necessary to gain a deeper understanding of the interconnected mechanisms that promote PEBs.

2. Literature review and hypotheses

2.1. Green transformational leadership (GTL)

Among all the leadership theories and models, transformational leadership has been most extensively studied due to its diverse impacts on employees' behaviors (Robertson and Barling, 2013a). Bass (1998) categorized transformational leadership into four behaviors: idealized influence, inspirational motivation, intellectual stimulation, and individualized consideration (Avolio and Bass, 1988).

Literature suggests that each of these behaviors could be applied to influence a diverse range of employee outcomes and behavior, including pro-environmental behaviors. Idealized influence refers to being a role model and displaying a charismatic personality that everyone would like to follow. In exhibiting idealized influence, transformational leaders follow a core set of green values, convictions, and commitment towards a collective good, which then will be idealized and practiced by the followers. Inspirational motivation centers on the ability of leaders to inspire and motivate their subordinates to forgo individual gains for the collective good. In the context of the current study, we conceptualize green inspirational motivation as the leaders' abilities to motivate and stimulate their subordinates to perform green and environmentally friendly behavior. Environmental intellectual stimulation refers to leaders' abilities and commitments to stimulate their subordinates to challenge assumptions and solicit ideas to overcome environmental issues in innovative ways. The fourth dimension of transformational leadership is individual consideration; leaders exhibiting environmental individual consideration exhibit compassion, empathy, and care for their subordinates' individual needs and wellbeing; in doing so, the leaders develop a strong relationship with followers through which the leaders can transfer their pro-environmental values. In a nutshell, green transformational leaders, through their idealized charismatic personality, inspire and motivate their subordinates to perform pro-environmental actions.

2.2. Green human resource management (GHRM)

GHRM is a term that applies to human resource management activities that are geared toward a firm's environmental and ecological impact. GHRM is linked with the organizations' environmental policy and employee ecological conduct (Renwick *et al.*, 2013). GHRM is significant to the literature on sustainable human resource management in a way that it accentuates to a greater extent on business environmental management practices. GHRM act as a channel between HRM practices and firm environmental management practices (Dumont *et al.*, 2017). Thus, GHRM reflects the organization's strategic commitment to environmental sustainability and calls on top management to pay close attention to organizational processes and strategies that encourage employees to engage in green job activities that help to minimize environmental emissions (Mishra *et al.*, 2014). In other words, GHRM entails the integration of an organization's environmental management objectives into its human resource systems, particularly the aspect such as performance management, incentives, training and development, and recruitment and selection (Muller-Carmem *et al.*, 2010).

2.3. Pro-environmental behaviors (PEBs)

Environmental conservation and sustainability have emerged as a key organizational objective in recent years, with firms striving to seek business operations that comply with environmentally friendly practices and operations. One way to achieve environmental sustainability is for employees to participate in PEBs on a more consistent and frequent basis. PEBs apply to any quantifiable responsible environmental practices that assist businesses in being environmentally friendly (Wesselink *et al.*, 2017) or employees' intention to participate in sustainable, green, and environmental actions (Scherbaum *et al.*, 2008). PEBs are typically unremunerated extra-role behaviors that employees exhibit for the benefit of their organizations (Ramus and Killmer, 2007). For example, workers can save resources by turning off unnecessary electrical equipment, using stairs instead of lifts, using double-sided papers for printing, and getting rid of unnecessary waste to protect the natural environment. Businesses have started emphasizing employee programs to improve environmental efficiency (Baughn *et al.*, 2007). The effectiveness of an organization in developing and enforcing numerous firm-level pro-environmental programs is contingent upon the PEBs of its employees (Robertson and Barling, 2013b). Additionally, PEBs contribute directly to the firms' financial and non-financial success (Wesselink *et al.*, 2017).

2.4. GTL and PEBs

Social psychology literature narrates that individuals learn behaviors by observing others and then try to exhibit similar patterns of behavior. Following this notion, we believe that transformational leaders, by exhibiting green behaviors, can influence their follower's behavior because organizational leaders are placed as role models (Brown *et al.*, 2005). Given the importance and significant role of transformational leaders in influencing employees' behavior, Robertson and Barling (2013) extended the use of transformational leadership in the environmental management context. Similar to task-orientated leadership, green transformational leaders focus on long-term and sustainable

development by integrating individuals' green values with organizational environmental values and inspiring individual self-driven pro--environmental behaviors. Similar to traditional transformational leadership, environment-specific or green transformational leadership is also divided into four behaviors; green individualized consideration, green idealized influence, green intellectual stimulation, and green inspirational motivation (Robertson and Carleton, 2018). Specifically, green idealized influence is a leadership characteristic demonstrated by leaders who set an example and act as an environmental role model, influencing the employee green behavior through their charisma.

Green inspirational motivation refers to a leadership characteristic denoting the ability of a leader to encourage employees to transcend their short term self-interest and to strive to achieve green goals; green intellectual stimulation denotes the leaders' ability to motivate their employees to challenge old ideas and use new methods to solve environmental problems; and green individualized consideration refers to the leadership behavior demonstrated by leaders in valuing their employees' contributions to green issues and helping them develop green skills (Robertson and Carleton, 2018). GTL can inspire workers to see the relevance and practicality of green behavior through green idealized influence and green inspiring motivation, allowing them to understand that green conduct is supported and anticipated by the business. At the same time, GTL may grow workers' thinking capacity about environmental concerns, enhance employees' environmental knowledge, and assist employees in constantly developing environmental skills via green intellectual stimulation and green customized attention. The end result is that employees are inclined to exhibit green behavior (Kura, 2016). To sum up, when employees perceive that leaders exhibit GTL behaviors, they exhibit more PEBs. Hence, it can be proposed that:

H1. Green transformational leadership positively influences employees' pro-environmental behavior

2.5. GTL and GHRM

Green transformational leadership (GTL) is a leadership style that provides a consistent vision, inspiration, and motivation to workers and subordinates to accomplish their developmental needs and goals to achieve the overall organization's environmental objectives (Chang and Chen, 2013). Whereas the GHRM is the strategic side of human resource management that focuses on achieving organizational sustainability by developing, motivating, and sustaining employees'' green behavior (Dumont *et al.*, 2017). GTL embodies the notion that top management has a prodigious impact on the company's GHRM practices and business operations (Renwick *et al.*, 2013). GTL in organizations is critical for creating supportive GHRM practices and policies that assist companies in achieving their objectives and visions for green success (Jia *et al.*, 2018). To put it another way, GTL underscores individual employees' needs to establish and enforce GHRM practices that will inspire and motivate the followers. Therefore, we anticipate that GTL can play a more significant role in promoting positive human resource management activities such as recruiting and selection, training and development, performance assessment and management, and compensation and reward programs as a means of inspiring, stimulating, and motivating subordinates to accomplish organizational goals (Zhu *et al.*, 2005). We argued that GTL uses GHRM as a tool to influence and enhance followers' capabilities and motivation. In this way, they provide their followers with an opportunity to participate in green activities (Berrone and Gomez-Mejia, 2009). Therefore, we predict that:

H2. Green transformational leadership positively influences green human resource management systems in organizations.

2.6. GHRM and PEBs

The past literature suggests that HRM is critical in shaping employees' job attitudes and behaviors (Pham *et al.*, 2019).GHRM practices encourage workers to adopt environmentally friendly behaviors (Cherian and Jacob, 2012) through their participation in greener initiatives. Additionally, GHRM activities assist businesses in reducing costs, increasing performance, improving the employee relationship with the firm, and conducting environmentally sustainable activities. Establishing green responsibilities and goals, coordinating corporate environmental management events, and promoting green behaviors among employees come under the umbrella of GHRM practices. Moreover, GHRM improves environmental efficiency by providing opportunities for employees to engage in and contribute to corporate green initiatives. Environmentally conscious jobs and task designs encourage workers to acquire ecological awareness. Also, it offers training in environmental management systems to enhance employees' participation in PEBs' (Tseng *et al.*, 2013). Once employees are rewarded for exhibiting green behavior, they become more motivated to engage in extra-role behavior, i.e., pro-environmental behavior. As a result, it has been proposed that GHRM activities can have a beneficial effect on employee PEBs in the workplace (Dumont *et al.*, 2017). Therefore, we predict that:

H3. Green human resource management positively influences employees' pro-environmental behaviors.

Leaders play a vital role in managing the dynamics of people and how they impact each other towards the organizational goals, whereas GHRM is focused on all the practices and activities geared towards fulfilling the organization's environmental management policies. We believe that leadership and GHRM jointly create an organizational environment that might promote green activities in organizations. However, a scarcity of literature integrates and develops leadership and HRM mechanisms to facilitate green activities in organizations. Only a few studies tested the intervening role of GHRM. For example, Singh *et al.* (2020) found the crucial mediating role of GHRM in GTL and green innovation, while Jian et al. (2020) suggested the indirect influence of GTL on PEBs through GHRM.

Similarly, studies in recent times (e.g., Ahmad *et al.*, 2021) also established the mediation of GHRM between ethical leadership and PEBs. Moreover, leadership literature authenticates that leadership indirectly affects the employees' attitude and behavior through mediators (Jiang *et al.*, 2012). Hence, based on the above empirical findings, we attempt to take GHRM as a mediator between GTL and employees' PEBs.

Furthermore, higher management encouragement, especially managerial support, inspires employees to take environmental actions such as designing eco-friendly products with fewer resources and reducing pollution. GTL thoroughly embodies top management's attitudes, convictions, principles, and habits and has a significant effect on corporate GHRM activities (Renwick *et al.*, 2013). Consequently, current research suggests that GTL is indispensable in developing GHRM policies and practices because GTL gives certain advantages to GHRM practices for several HR functions such as performance management, talent management, and employee productivity (Bass and Riggio, 2006), which enables employees to exhibit PEBs. Therefore, it can be proposed that:

H4. The relationship between green transformational leadership and employees' pro-environmental behaviors is mediated by green human resource management.

2.7. Environmental knowledge (EK) as moderator

Environmental knowledge refers to understanding the fragility of the environment and the importance of its protection. Being aware of the environment means how human behavior impacts the environment and taking corrective actions. Knowledge is considered one of the essential

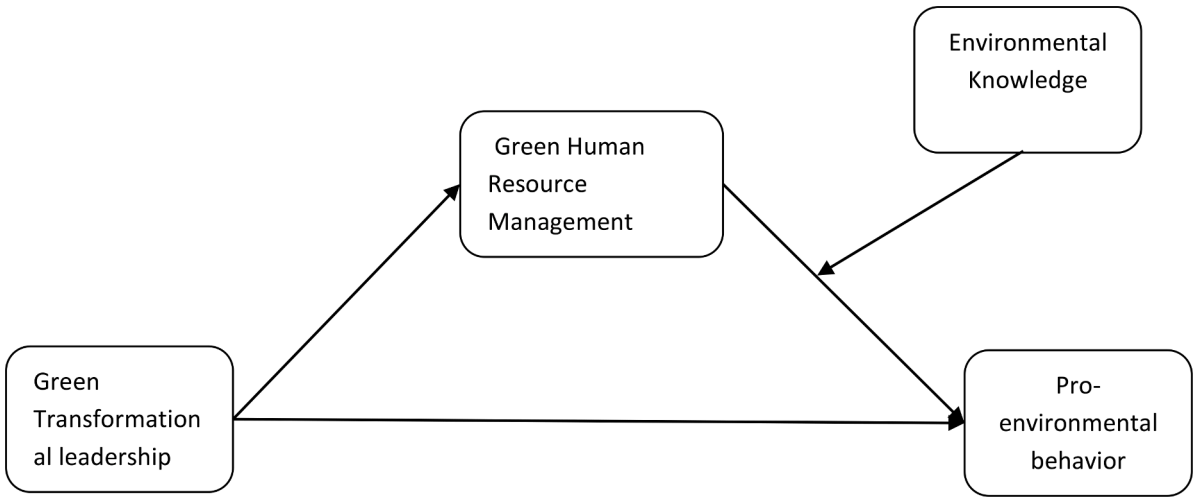

Fig. 1. Hypothesized Model of the study.

aspects for successfully implementing the action. We believe that employees with greater awareness of the environment will be more inclined to green activities. Employees that work for a green company, for example, are more likely to participate in eco-initiatives since they are recruited and selected with a good environmental attitude and expertise (Anwar *et al.*, 2020). Individuals vary in their awareness and knowledge of environmental challenges; thus, it is imperative to investigate the boundary condition placed by the level of knowledge between the GHRM-PEBs link. The rationale of such boundary condition relies on the person-environment fit theory (Edwards, 1996), which argues that GHRM can influence employees' PEBs by moderating individual characteristics like knowledge (Gilal *et al.*, 2019). Drawing on the demands–ability fit (D-A fit) notion of Edwards's theory, we explore the possible intervening role of EK.

The D-A fit refers to the match between a person's abilities and environmental demands. Knowledge, skills, energy, and time are examples of abilities that a person can use to fulfill environmental needs (Edwards, 1996). Employees' EK may be seen as the ability side of the idea, while HRM practices can be thought of as the demands side (Ahmad *et al.*, 2021; Edwards and Shipp, 2007). Individuals are well-known for applying their expertise and talents to meet organizational needs. Despite this, only a few studies have used the D-A fit theoretical approach to investigate the moderating of EK in the GHRM-PEB connection. Thus, this study proposes that employees with a greater level of EK are expected to put that knowledge into practice by showing PEB than those with lower levels of EK. As a result, it is suggested that:

H5: Environmental knowledge moderates the GHRM-PEB link, such that the link will be more substantial for employees with higher knowledge than those with a lower knowledge.

3. Research method

3.1. Sampling and procedure

The current research collected data from the manufacturing industries located in the large industrial estates of Pakistan to test the hypothesized model (Fig. 1). Collecting data from manufacturing concerns can be justified based on the following reasons. First, manufacturing firms' carbon footprint and disposal activities have led to worries and concerns regarding hazards to public health and environmental pollution (Perkins et al., 2014). Second, Pakistan's increasing urbanization and rapid industrialization have raised the need for sustainable production and consumption. Third, the engagement of manufacturing companies and the disclosure of environmental and social information in the Pakistani environment is greater than other sectors since these companies have large resources and urge stakeholders to build a favorable image of society (Nameghi and Ariffin, 2013). Hence, the environmental agencies and government have urged manufacturing firms to be eco-friendly and design green products. Thus, it is essential to investigate how manufacturing firms can reduce their environmental footprint in Pakistan by employing GTL and GHRM practices. Data were collected from supervisor-subordinate dyads. Subordinates were asked to rate their perceptions of GHRM, EK, and GTL, while supervisors were asked to rate their subordinates' PEB. A total of 305 responses were collected; however, after removing incomplete responses, we were left with 280 valid responses for our analysis. The majority of the respondent was male. (54.5%). While 63.4% of respondents had work experience between 5-10 years.

3.2. Measures

The current research collected data on variables, namely GTL, GHRM, and PEBs, and these variables are measured through 7 points Likert scale. This study employed a scale developed by (Dumont et al., 2017) comprising six items to measure GHRM. Sample items include: "My organization relates employees' eco-friendly behavior to compensation and rewards." Past studies (Fawehinmi *et al.*, 2020) used this scale to assess the GHRM." PEB was measured by employing six items scale developed by (Robertson and Barling, 2013b). Sample items include "I turn lights off when not in use." This research employed a 6-items scale to measure GTL developed by Chen and Chang (2013). Responses regarding environmental knowledge were gathered using a three-item scale developed by (Fawehinmi *et al.*, 2020).

4. Data analysis

The present study examined the hypothesized model using partial least squares structural equation modeling (PLS-SEM). This technique is extensively used in management research (AlNuaimi *et al.*, 2021; del-Castillo-Feito *et al.*, 2022; Kusi-Sarpong *et al.*, 2021; Mokha and Kumar, 2021).

PLS-SEM is considered a soft modeling approach that is not appropriate for testing well-established theoretical models (Wilden *et al.*, 2013). However, this technique is suitable for testing theories and models that are not well developed, as is the case of the current study model. Although several studies have investigated the antecedents of pro-environmental behavior, very few studies have investigated the interaction among GTL, GHRM, EK, and PEBs. Thus, the theoretical

Table 1
Measurement model Validity and Reliability.

	Items	Loadings	Composite Reliability	AVE
Green HRM	GHRM1	0.697	0.931	0.693
	GHRM2	0.780		
	GHRM3	0.896		
	GHRM4	0.881		
	GHRM5	0.894		
	GHRM6	0.829		
Green Transformational Leadership	GTL1	0.888	0.954	0.777
	GTL2	0.868		
	GTL3	0.888		
	GTL4	0.883		
	GTL5	0.882		
	GTL6	0.879		
Pro-environmental Behaviors	PEB1	0.848	0.944	0.737
	PEB2	0.852		
	PEB3	0.829		
	PEB4	0.895		
	PEB5	0.870		
	PEB6	0.856		
Environmental Knowledge				
	EK1	0.735	0.788	0.554
	EK2	0.704		
	EK3	0.792		

Table 2
Exogenous variables' discriminant validity (HTMT Ratio).

Construct	GTL	Green HRM	PEB
GTL			
Green HRM	0.806		
PEB	0.791	0.846	

model of our research is not well established; therefore, PLS-SEM is an appropriate technique for testing it.

4.1. Measurement model

Data analysis through PLS-SEM is a two-step process. First, the outer (measurement) model should be tested for establishing validity and reliability. For this purpose, we investigated the discriminant validity, average variance extracted, and composite reliability. The results in Table 1 show that CR values suggested a good internal consistency as all of the values exceeded the recommended criterion of 0.7 (Hair et al., 2017).

Hair et al. (2017) suggested that factor loadings above 0.60 are considered to be acceptable. All factor loadings in this study were above the recommended value of 0.60. The study findings also suggested the adequacy of AVE as all the values exceeded the cut-off value of 0.5 (Hair et al., 2017). The current research also employed the Heterotrait-Monotrait ratio of correlations (HTMT) to examine discriminant validity (DV) (Table 2). The result suggested the adequacy of DV as all the HTMT values were less than the recommended 0.90 (Henseler *et al.*, 2015).

In the second step, we assessed the structural model. For this, the coefficient of determination (R^2) and predictive relevance (Q^2) were calculated before the hypothesized associations were examined. Using cross-validated redundancy, the blindfolding technique revealed that each Q^2 value exceeded 0. Green HRM (0.380); and PEB (0.484) are the Q^2 values for this study. The R square (Fig. 2) values showed that green transformational leadership causes 55.5% changes in green HRM and 66.6% change in pro-environmental behavior; these values indicate the substantial effect of green leadership. To validate statistical significance, a bootstrapping procedure with 5,000 resamples was used to generate standard errors and t-values (Hair *et al.*, 2017). Fig. 3

The statistical significance (p 0.05) of the path coefficients of relationships can be seen in Table 3. The findings (B= 0364., t =5.595, p 0.00) show that GTL has a significant relationship with PEBs, implying that H1 is supported. Similarly, results show that GTL has a significant impact on green HRM (B= 0.745., t =21.348, p 0.00), and green HRM significantly influences PEB (B= 0.508., t =7.905, p 0.00), hence supporting our hypothesized relationships

The hypothesis on mediation effect was tested using the SmartPLS bootstrapping function, as recommended by Hair et al. (2017). Bootstrapping makes no assumptions about the form of the variable distribution or the sampling distribution of the statistics. The results show (Table 4) that GTL had a significant indirect effect on PEBs through GHRM (Beta =0.378., t value =). The results also indicated the presence of complementary mediation, as Hair et al. (2017) suggested that if both

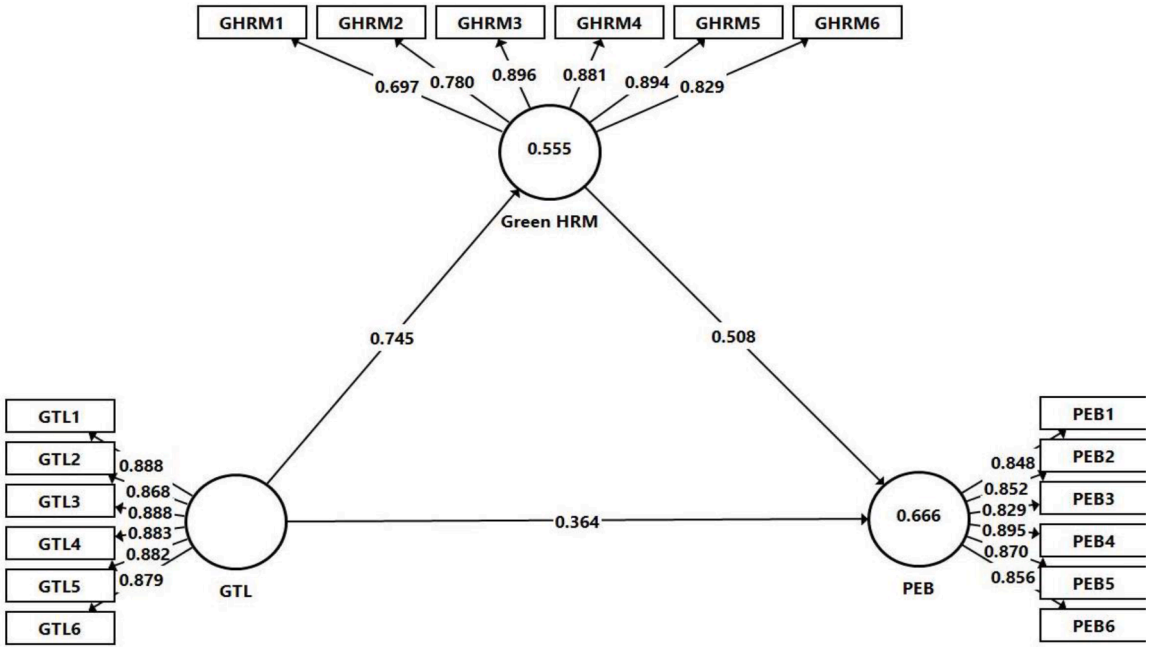

Fig. 2. Measurement model.

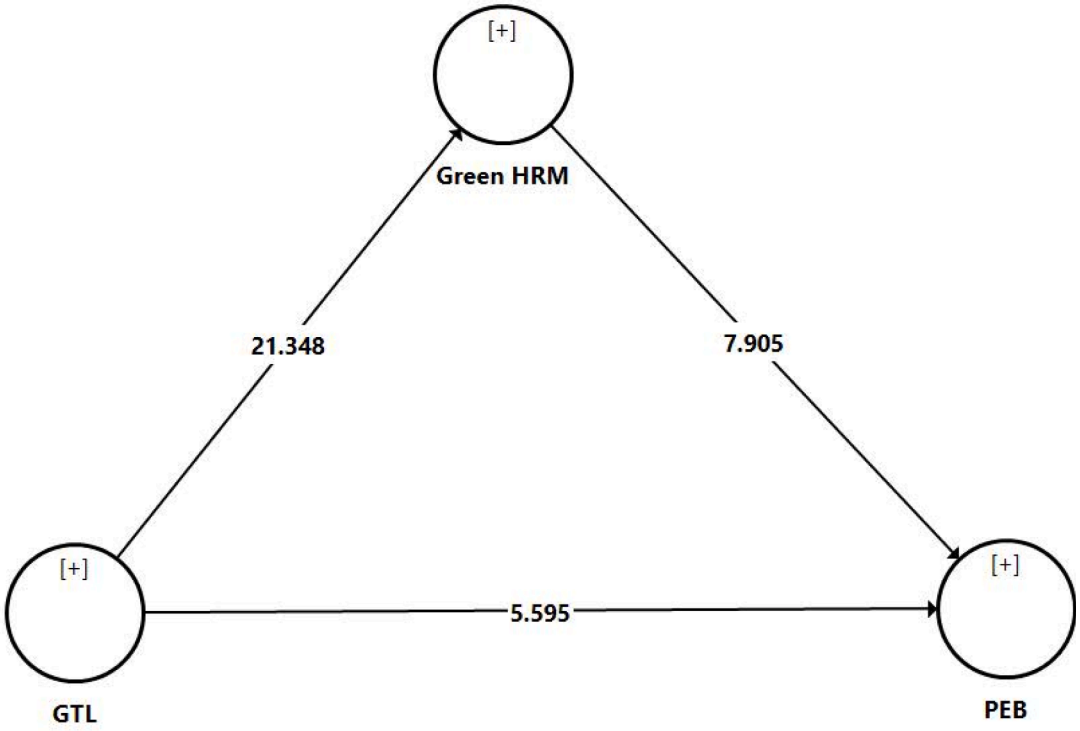

Fig. 3. Structural Model.

Table 3
results of bootstrapping.

Paths	Path coefficient	T Statistics	P Values
GTL -> GHRM	0.745	21.348	0.000
GTL -> PEB	0.364	5.595	0.000
GHRM -> PEB	0.508	7.905	0.000

Table 4
Mediation of GHRM between GTL and PEB.

Path	Path coefficient	T Statistics	P Values	95% CI	Decision
GTL -> GHRM -> PEB	0.378	7.474	0	[0.284-0.474]	Supported

Table 5
Moderation Analysis.

Path	Path coefficient	T Statistics	P Values	95% CI
Moderating Effect (EK) -> PEB	0.081	2.366	0.018	[0.018-0.150]

direct and indirect effects are significant and pointed in the same direction, complementary mediation exists.

4.2. Moderation analysis

As suggested by Hair et al. (2017), we employed the product indicator method to demonstrate the moderating influence of environmental knowledge on the GHRM-PEB relationship. We expected that high environmental knowledge would increase PEB and vice versa. Table 5 shows that environmental knowledge has a strong moderating influence on GHRM and PEB.

In addition to the significance of moderating impact, the interpretation of moderation analysis is frequently regarded as a challenge; the graphical representation may therefore contribute to the comprehension of data and form a conclusion. Higher environmental knowledge has a steeper slope than low environmental knowledge, as seen in Fig. 4. That is, a higher level of EK strengthens the link between GHRM and PEB.

5. Discussion and implications

Although organizations significantly deteriorate the environment, they can also play a pivotal role in protecting and preserving the environment. One such strategy that organizations are implementing to enhance environmental conservation is fostering employees' pro-environmental behavior. To stimulate employees' pro-environmental behavior, it is vital to comprehend the factors impacting these actions and behaviors. One such factor is leadership. Leaders in organizations not only influence traditional organizational outcomes but also impact some emerging outcomes such as environmental management. However, less is known about this, especially in the Pakistani context. Thus, to fill this gap, we developed and tested a pro-environmental behavior model in which we investigated the role of GTL, GHRM, and environmental knowledge. In doing, so the study contributed to literature in several ways.

First, most of the existing literature on transformational leadership focuses on employees' non-green outcomes. Our study investigates the role of environmental-specific transformational leadership in fostering the employees' pro-environmental behaviors, which is a unique contribution to leadership literature (Ahmad *et al.*, 2021).

Second, drawing on the study results, we argue that GTL is a crucial resource that organizations should use to implement GHRM systems, which will ultimately help foster employees' pro-environmental behaviors. This stance aligns with the notion that employees' PEBs are more likely to be supported in the workplace when leaders take a proactive stance on environmental concerns (Afsar *et al.*, 2016; Robertson and Barling, 2013a).

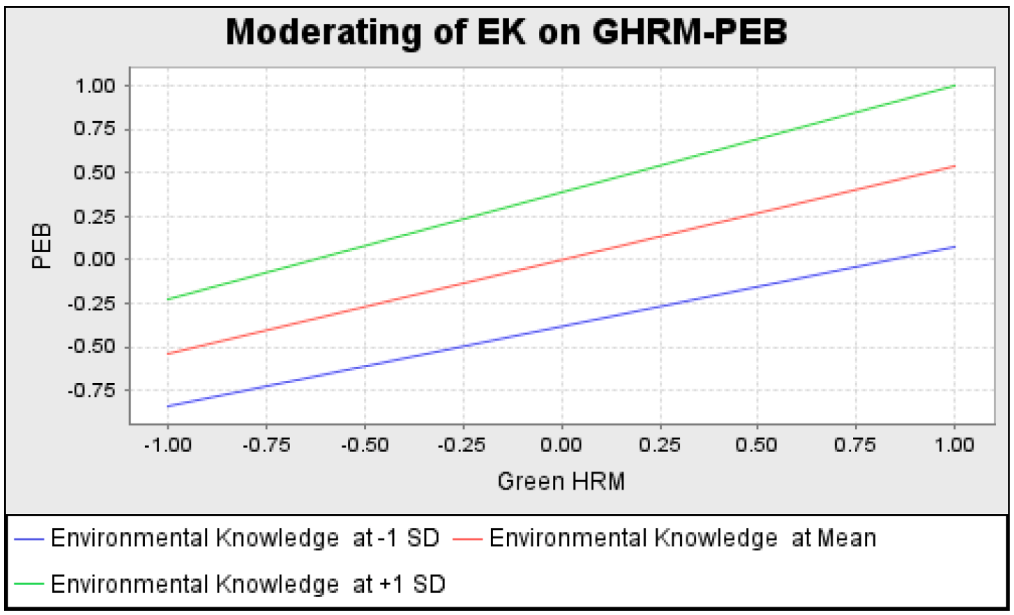

Fig. 4. Slope Plot for Moderation analysis.

Third, this study presents a thorough and synergistic comprehension of the process through which PEB can be promoted. For this purpose, the study attests role of GHRM in mediating the relationship between green leadership and PEB and offers a deeper understanding of the interconnected mechanisms that promote PEBs, and eventually provide guidance for organizational practice.

Finally, the results indicated that employees' environmental knowledge moderated the GHRM-PEB link; we may deduce from these findings that individuals aware of environmental concerns are more likely to exhibit ecological behavior. Individuals' understanding of environmental problems, processes, and remedies raises their consideration and awareness of the need to take a role in environmental protection. Individual environmental awareness is most crucial for environmental management.

5.1. Practical implications

The current research offers valuable insights for organizational development and leadership. For the organization's long-term survival and viability, leadership should guarantee that GHRM practices are included in strategic initiatives. The transformative leadership traits of managers have been proven to substantially impact subordinates' participation in PEBs. These findings show that leaders should not only guarantee that environmentally-friendly procedures have been discussed with employees and that GHRM practices are applied but also set an example by modeling the expected behavior. Green transformational leaders that model pro-environmental conduct and promote followers' participation in such behavior are needed to successfully adopt GHRM techniques in organizations. Organizations should define environmental performance goals and promote an open communication culture in which employees are mentored and their bosses are trained on how to meet those goals. Managers should inquire about their previous environmental performance while hiring new employees or elevating existing employees to senior positions. An evaluation of the candidate's environmental expertise should be included in the selection and promotion panels. Furthermore, the results of this study have societal implications. It focuses public attention on individuals and organizations who behave in a socially responsible and ecologically conscious manner.

It establishes the importance of organizational leadership's involvement in generating behaviors aimed at energy conservation, water preservation, and waste reduction in society. Following the moderating function of environmental knowledge in PEB, policymakers should arrange training and seminars to increase the environmental knowledge of employees. This is based on the premise that employees with environmental awareness demonstrate higher environmental care and protection than those with less understanding. Employees with increased environmental awareness might feel accountable to the firm and society and want to pursue their social tasks. In order to promote strong environmental practices at all levels of the business, several environmental education efforts are necessary. Moreover, disciplinary measures should be dissuasive enough to avoid environmental damage.

5.2. Limitations and future research directions

Despite current research methodological strengths and significant implications, it is not without limitations. First, this study collected data from the manufacturing industry in Pakistan, which limits the generalizability of this study. Thus, future research should focus on other industries. Second, the current research examines the influence of GTL in the Pakistani context only; therefore, we suggest future studies should conduct cross-country analysis. Third, although the present research examined the mediation of GHRM in linking GTL with employees' PEB, there can still be other potential mediators.

CRediT authorship contribution statement

Muhammad Farrukh: Conceptualization, Methodology, Formal analysis, Writing – original draft, Writing – review & editing. **Nabeel Ansari:** Conceptualization, Data curation, Writing – original draft. **Ali Raza:** Methodology, Writing – review & editing. **Yihua Wu:** Data curation, Writing – review & editing, Validation. **Hong Wang:** Data curation, Writing – review & editing, Validation.

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