
EXAMINING THE EFFECT OF ETHICAL LEADERSHIP ON GREEN WORK OUTCOMES: A MODERATED MEDIATION ANALYSIS

¹Ahmed Abdul Hameed*, ¹Zafar-uz-Zaman Anjum, ²Maria Rasheed,
¹Imran Khalid, ³Muhammad Umar, Aasim Naimat Gill

Comsats University Islamabad, Lahore Campus, Pakistan

²Virtual University of Pakistan

³Lahore Business School, The University of Lahore, Pakistan

*Corresponding Author: ahmed_abdul_hameed@yahoo.com

Abstract

The current study examines the direct effect of ethical leadership (EL) on employee green commitment (EGC) and the indirect effect on employee green innovative work behavior (EGIWB). It also tested the moderating effect of employee green knowledge (EGK) in the relationship between EL and EGC. Data were collected from 359 employees working in the manufacturing sector of Pakistan. Time lagged and conveniences sampling technique was adopted. The statistical results showed that EL was positively related to EGC. EGC enhances the EGIWB. Moreover, results showed that EGK moderates the relationship between EL and EGC. Such that employees having high green knowledge have more inclination towards green commitment. The results also showed that EL enhances EGIWB via EGC. Moderated mediation results also showed that EGK strengthens the indirect relationship between EL and EGIWB. Result depicted that employee having high green knowledge shows more green innovative work behavior via increased green commitment. The study brings important practical implications for top and middle managers and addresses their concerns about green practices and green innovations in their firms.

Keywords: Ethical Leadership, Employee Green Commitment, Employee Green Knowledge, Employee Green Innovative Work Behavior.

Introduction

The foundation of environmental-friendly management in the business organization (Hameed, Waqas, & Anjum, 2022), has gained much awareness due to ecological problems and is considered as the pathway to a sustainable environment (Chiou, Chan, Lettice, & Chung, 2011; Font & Lynes, 2020; Shu, Zhou, Xiao, & Gao, 2016). Businesses around the world have taken various measures to confront ecological problems (Lin & Chen, 2017) for instance reduction of renewable energy resources and difficulties due to environmental changes (Gallagher, 2012). The excessive use of natural resources resulted in environmental problems (Weng, Chen, &

Chen, 2015). Various renowned manufacturing organizations are now taking part in “going green” campaigns and initiatives to manage the unfavorable environmental effects. There is a strong emphasis by the researchers to improve environmental performance in the manufacturing sector (Hameed et al., 2022).

Literature suggested that employees behavior plays an important part in the success and failure of organizational initiatives that have been taken for environmental protection (Unsworth, Dmitrieva, & Adriasola, 2013). Recently research scholars have shown greater interest in employees’ environmental knowledge, attitudes, and behaviors as employees lay down a strong foundation, support, and motivation in the implementation of green policies and practices (Aboramadan, Kundi, & Farao, 2021; Robertson & Carleton, 2018; Umrani et al., 2020). Previous research studies have investigated green performance at the organizational level (Khan, Ali, Usman, Saleem, & Jianguo, 2019) and opened new avenues to investigate green performance and environmental-friendly behaviors at the individual level (Luu, 2019a). Further research studies also suggest investigating the various underline mechanism that promotes employees green and pro-environmental behaviors (Hameed et al., 2022; Luu, 2019a; Saleem, Qadeer, Mahmood, Ariza-Montes, & Han, 2020).

Studies suggest that leaders are the important source in the effective implementation of pro-environmental and green initiatives (Hameed et al., 2022; Khan et al., 2019; Lasrado & Zakaria, 2020; Saleem et al., 2020). Recently the literature has highlighted the value of leadership in improving individual and organizational level green performance (Aboramadan et al., 2021; Luu, 2019b). Research on employee pro-environmental and green behaviors has been focused on various leadership styles such as servant leadership (Aboramadan et al., 2021; Luu, 2019b; Ying, Faraz, Ahmed, & Raza, 2020), transformational leadership (Chen & Chang, 2013), transactional leadership (Robertson & Barling, 2013), and EL (Hameed et al., 2022; Saleem et al., 2020). Previous empirical studies have offered much insight into the relationship between EL and pro-environmental and green outcomes. Despite being insightful, previous studies have ignored the important relationship between EL and employee green innovative work behavior (EGIWB) specifically in the manufacturing sector.

In general, EL is important for positive work-related outcomes. EL has positively affected employee green behavior in the hospitality industry (Wood, Eid, & Agag, 2021), education industry (Saleem et al., 2020), and manufacturing industry (Hameed et al., 2022). Furthermore, EL was found to positively affect innovative work behavior (Ahmed Iqbal, Abid, Contreras, Hassan, & Zafar, 2020), employee creativity (Asif, Miao, Jameel, Manzoor, & Hussain, 2020), organizational citizenship behavior (Farid et al., 2020), employee well-being (Ejaz, Anjum, Rasheed, Waqas, & Hameed 2022) and innovative work behavior (Ahmed Iqbal et al., 2020).

EL has its focus on care, motivation, and concern for their society and followers and has been considered an effective force in shaping employee green behaviors (Hameed et al., 2022) and pro-environmental behaviors (Ahmad, Islam, Sadiq, & Kaleem, 2021). EL is an important leadership style that promotes employee pro-environmental needs and behaviors (Khan et al., 2019). EL shows discomfort for the society and proactively work for the wellbeing and advancement of the society (Treviño, Hartman, & Brown, 2000). This study focuses on EL, because of features such as social responsiveness, benevolence, and, most significantly, ethics (Khan et al., 2019). EL aims to promote employee green and pro-environmental behaviors (Saleem et al., 2020). Furthermore, this study based on social learning theory (SLT) (Bandura,

1986) argued that EL helps in shaping employee pro-environmental and green behaviors through the act of role modeling.

This study investigates the impact of EL on EGIWB, employee green commitment (EGC) as a mediator and examines the role of employee green knowledge (EGK) as a moderator in response to scholarly calls to enrich green management literature. Furthermore, based on previous research on EL in the manufacturing sector (Hameed et al., 2022), this study predicts that EGC mediates the relationship between EL and EGIWB, and EGK work as a boundary condition between EL and EGK.

Our research contributes to the literature in many ways. First, we answer the previous research calls to investigate the impact of EL on employee green and social behaviors (De Roeck & Farooq, 2018). Scholars are more interested in how various leadership styles encourage people to engage in environmentally friendly behaviors and how this helps to lessen the negative consequences of business activities on the environment while maintaining profit margins (Saeed et al., 2019). Furthermore, this study also contributes to the literature by focusing on green individual outcomes instead of green organizational outcomes. This study is also helpful in explaining the relationship between EL and EGIWB in the manufacturing sector. Second little is known about the mechanisms between EL and EGIWB, specifically in manufacturing industry. Third, this study extends the literature of EL and innovative work behavior (Ahmed Iqbal et al., 2020) to EGIWB, with the theoretical lens of Bandura (1986), SLT.

Literature suggested that EL fosters commitment among employees through role modeling (Hansen, Alge, Brown, Jackson, & Dunford, 2013). Role modeling plays a significant role in identification, observational learning, and impersonation (Brown, Treviño, & Harrison, 2005). SLT suggests that employees learn different behavior by observations and their outcomes (Bandura, 1986). Our study suggests that EL influences EGC that subsequently affects EGIWB. Numerous researchers are increasingly calling for the identification of various mediation mechanisms between the EL and employee green and pro-environmental behaviors (Khan et al., 2019; Saleem et al., 2020). This research study answers the research calls to examine and identify the mediating role of EGC between EL and EGIWB.

Furthermore, we suggest that EGK can influence the relationship between EL and EGC. Employees with green knowledge when to observe the green and ethical behavior of their top leadership, their green and environmental commitment to protect the environment increased. EGK promotes employee green attitudes such as EGC (Pham, Tučková, & Phan, 2019). Literature suggests EGC is an antecedent of pro-environmental behavior (Safari, Salehzadeh, Panahi, & Abolghasemian, 2018). A recent leadership study by Su et al. (2020) considered EGK as a boundary condition between environmental leadership and green innovation. Despite these scholarly efforts, the researchers have not addressed the role of EGK as a moderator in the relationship between EL and EGC in the manufacturing sector (Hameed et al., 2022). As a result, the goal of this study is to fill a vacuum in the literature by looking at the moderated relationship of EGK between EL and EGC.

Literature Review and Hypothesis development

Ethical leadership (EL) and employee green commitment (EGC)

EL is defined as “*the demonstration of normatively appropriate conduct through personal actions and interpersonal relationships, and the promotion of such conduct to followers through two-way communication, reinforcement, and decision-making*” (Brown, Treviño, & Harrison, 2005, p. 120). There are few personality traits (such as care, fairness, integrity, honesty,

accountability, and concern for others) which are considered to be the compulsory part of ethical leaders (Treviño et al. (2000)). It has been observed in several research articles (Brown, Treviño, & Harrison, 2005; Shafique, Ahmad, & Kalyar, 2019; Usman & Hameed 2017) that care, honesty, and concern for others are considered as the key practices followed by the EL. The key responsibility of the EL is to develop and promote the ethical culture in the organizations, and to motivate the followers to share the same values of ethics while interacting with stakeholders and the natural environment (Wu, Kwan, Yim, Chiu, & He, 2015).

In connection to the above debate, there is a number of job attitudes that have been discussed by the organizational behavior experts in the green context, and one of the most studied attitudes is green commitment (Liu, Wang, Hu, Lin, & Mao, 2020). The drive behind practicing the green commitment comes from the top leadership. Top leadership can do it by showing their interest in care for the community, and protection of the natural environment (Hameed et al., 2022). EL are expected to display their commitment and green behavior towards the environment because they are expected to behave as role models by displaying the appropriate behaviors (Brown, Treviño, & Harrison, 2005). Consequently, followers will do the same and take organizational as well as societal interests ahead of their interest and will seek it as an obligation to behave responsibly towards all stakeholders and the natural environment (Wu et al., 2015). Ethical leaders are the one who inspires and entrusts his followers to exploit and find opportunities relating to the environment by creating a vision for environmental sustainability (Khan et al., 2019; Lu, 2011). Environmental sustainability is considered as one of the important components of moral values and ethical behaviors are considered as important positive drivers to the pursuit of environmental sustainability (Brown, Treviño, & Harrison, 2005).

As per Treviño et al. (2000), there are two main pillars (i.e., moral manager and moral person) for EL. The basic characteristic of a moral manager/leader is to protect the environment from natural disasters by creating strong ethical rules, guidelines, and standards (Brown, Treviño, & Harrison, 2005). EL are equally concerned for their subordinates because they are principled and fair leaders (Brown, Treviño, & Harrison, 2005). This shows that top leadership can originate and enhance the urge for green commitment in their followers by creating and following the green environment-related rules and regulations towards environmental protection (Hansen et al., 2013).

Traits such as fairness, concern for others, trust, honesty, etc. are the given central are the important tools to evaluate the EL (Brown & Treviño, 2006; Treviño et al., 2000). It has been observed by the researchers (Hansen et al., 2013; Ruiz, Ruiz, & Martínez, 2011) that followers reciprocate the same committed environmental behaviors and patterns of their leaders/managers. Concern for society and, concern for others is the main building block of any EL (Brown & Treviño, 2006; Brown, Treviño, & Harrison, 2005; Paharia, 2019; Usman & Hameed 2017) because their main concern is to work for the betterment of environmental issues by demonstrating strong green commitment.

Thirdly, by looking into the lens of Badura's (1986) social learning theory, it can be depicted that followers follow the acts of their role models. Therefore, EL can create and demonstrate high ethical standards and strong commitment (Hansen et al., 2013), which has also been observed by the other research (see for example; Addai, Avor, Ofori, & Tweneboah, 2019; Elçi, Şener, Aksoy, & Alpan, 2012; Ruiz et al., 2011; Treviño et al., 2000). Based upon the above discussions, this study highlighted the importance of EGC, and we proposed the following hypothesis.

Hypothesis 1: EL positively and significantly influences EGC.

Employee green commitment (EGC) and employee green innovative work behavior (EGIWB)

Individuals may vary in their identification and involvement in any particular organization that may be termed as employee commitment (Meyer & Herscovitch, 2001). The level of employee beliefs to accept organizational goals and stand with the organization to achieve those goals measure the level of employee commitment with the origination (Marthis & Jackson, 2000). Employee commitment explains the level of their connection and involvement in the organization (Siengthai, Swierczek, & Bamel, 2019). Moreover, employee commitment explains their attachment to the specific aspect of organizational activities (Irefin, Mechanic, & Science, 2014). When employees are committed to their organization, they relate their goals, ambitions, and attention to the attainment of organizational goals effectively. In recent research at the workplace, the concern for nature protection is evolved that also promote the commitment to protect natural environment (Cantor, Morrow, & Montabon, 2012; Paillé, Valéau, & Environment, 2021). Employee environmental or green commitment can be defined as the “extent to which an individual is dedicated to the environment and willing to engage in pro-environmental behavior” (Mesmer-Magnus, Viswesvaran, & Wiernik, 2012), it also called as “motivational process stemming from the bond to the environment (Cantor et al., 2012).

Moreover, the commitment to the cause of the organization such as environmental protection depends upon the psychological attachment and sense of responsibility to the goals of the organization (Kim, Kim, Choi, & Phetvaroon, 2019). EGC is defined as an “internal obligation with the motive to preserve the environment” (Montabon, Pagell, & Wu, 2016).

Seemingly EGC is their concern and involvement for nature and environment at the workplace. Employees having high commitment and passion for the environment shows more pro-environmental behavior at the workplace (Ansari, Farrukh, & Raza, 2021). In the employee commitment research, literature shows that employee commitment brings employee innovation practices as innovations are an extra-role behavior (Devece, Palacios-Marqués, & Alguacil, 2016; Nguyen, Siengthai, Swierczek, & Bamel, 2019). Research shows that employees who are committed to their organization are more likely to put extra attention to fulfill their tasks and are likely to bring innovation and creativity with an aim to satisfy the associated stakeholders (Nguyen et al., 2019). Moreover, research shows that a higher employee commitment level fosters high employee innovation within the organization (Diehl & Seeck, 2017; Meyer, Stanley, Herscovitch, & Topolnysky, 2002; Nguyen et al., 2019; Thamrin & Technology, 2012). Previous research illustrates that organizations providing good opportunities to the employee, and employees are committed to their organization it resultantly brings more chances of innovation by the employees (Silverman, 2017). Though innovation is a risky process that may involve high cost and risk of failure too so it is carried by only those employees who are highly committed to their work and origination (Brunetto et al., 2013).

Therefore, in organizations where commitment-based employee practices exist the uniqueness and strategic value of human capital are also high (Seeck & Diehl, 2017). Extant literature and empirical findings of the research show the impact of employee commitment on employee innovative behavior within the organization (Brunetto et al., 2013; Nguyen et al., 2019). Following the social learning theory when leaders are more concerned about environmental protection the same is reciprocated in the employees. Employees who are more concerned for environmental protection and psychologically attached to nature-saving activities show more pro-environmental behavior at the workplace (Afsar, Cheema, Javed, & Management, 2018;

Ansari et al., 2021). The employees who are more concerned and attached to environmental protection will be better able to bring green innovation. That green commitment brings new ideas and knowledge to apply for green product and process innovation (Liu & Zhao, 2019). Consequently, it can posit that employees who are committed to endorsing environmental protection activities they put their knowledge and ideas to bring more innovative solution to environmental issues. Therefore, employees having high green commitment enables them to put their knowledge and ideas acquired to bring green innovation at workplace. There we can posit the following hypothesis.

Hypothesis 2: EGC has a positive and significant impact on EGIWB.

Employee green commitment (EGC) as a mediator

This has been observed that EL not only affects directly the employees' attitudes and behaviors but also has indirect impacts through different mediation mechanisms (Khan et al., 2019; Saleem et al., 2020). Recent research (Addai, Avor, Ofori, & Tweneboah, 2019; Ahadiat & Dacko-Pikiewicz, 2020; Elçi, Şener, Aksoy, & Alpan, 2012; Ruiz et al., 2011; Treviño et al., 2000) has proven the positive significant role of EL on employee commitment. Perez, Amichai-Hamburger, and Shterental (2009) have observed the positive role of environmental management system towards EGC at work. More importantly, it has been observed that employees' involvement and interest in environmental issues help in enhancing their knowledge and understanding about eco-friendly issues, which has a positive impact on their commitment towards environmental concerns (Jabbour, Santos, & Nagano, 2008). Ansari, Farrukh, and Raza (2020) evaluated that green commitment is a strong predictor of pro-environmental behavior. Employees' concern about the green commitment results in green behaviors (e.g., saving office supplies, energy conservation, etc.) (Lee, 2011).

As per the researcher's knowledge, very little is available for the relationship between EL and EGIWB. Moreover, literature could not propose or investigate the mediating influence of EGC and between the relationship of EL and EGIWB. However, a dearth of literature has stressed the importance of EGC and in connection to leadership and the number of work-related outcomes (Hameed et al., 2022). One of the research conducted by (Liu et al., 2020), investigated the mediating role of green commitment between the relationship of green transformational leadership and green creativity. Based upon the prior evidence, we propose the green commitment as a connecting mechanism between EL and EGIWB. By keeping in view, the above discussed theoretical, empirical evidence, and, upon H1 and H2, this study hypothesizes the following statement.

Hypothesis 3: EGC significantly mediates the effect of EL on EGIWB.

Employee green knowledge (EGK) as a moderator

Green knowledge is explained as awareness about concepts, facts, and information related to the ecosystems and natural environment (Fryxell & Lo, 2003). Green knowledge refers to the environmental knowledge of institutions and employees about, the globe, or the environment, and their collective efforts and behaviors to protect the environment in long term (Hameed et al., 2022). The current study aims to suggest that high green knowledge plays a very strong positive role to make employees committed as compared to no or low green knowledge. Employees with enough knowledge about environmental issues have the potential to show high commitment towards the environment, hence, keep the ability to impact the environment positively (Safari et al., 2018). As per the prior discussions, the ethical leader is the one who displays required appropriate ethical behaviors and also helps others to promote ethical conduct in the

organizations (Brown, Treviño, & Harrison, 2005). Unselfishness, caring, motivation are the characteristics that are expected from ethical leaders (Treviño, Brown, & Hartman, 2003). A moral manager and moral person are considered to be the main blocks of EL (Treviño et al. (2000). First, it is the responsibility of a moral manager, it is his prime responsibility to introduce the ethical standards, guidelines, rules, etc., for the betterment of the environment and sustainable development, which can ultimately influence and endorse the ethical culture within the organization, and results in practicing green commitment. On the other side, EL as a moral person is evaluated on honesty, concern for others, fairness, etc., which urge the leader to work for the betterment of others and society by displaying green commitment in their professional and personal lives (Brown & Treviño, 2006; Brown, Treviño, & Harrison, 2005; Usman & Hameed, 2017). Drawing upon SLT (Bandura, 1977, 1986), it can be argued that individuals try to follow their role models and copy the actions or behaviors. This can also be implemented in green attitudes and behaviors context as EL focuses on green knowledge and displays green commitment which ultimately influences the commitments and behaviors of followers. This can also be done through involving employees in decision making, by getting their feedbacks, and supporting their suggestions about environment. Based on this discussion, it can be argued that employee with green knowledge along with the EL will display more commitment towards environment, hence, follow the environmental rules, policies, and regulations in better way.

Hypothesis 4: EGK positively moderates the positive association between EL and EGC. Such that the relationship is strong when EGK is high.

Moderated mediation

Cumulatively, it can be proposed that level of employee green behavior is the most important condition in order to explain the mediating role of EGC in the positive connection of EL and EGIWB. We are proposing moderated mediation (Edwards & Lambert, 2007; Preacher, Rucker, & Hayes, 2007a). To be more specific, the extent to which an EGC (mediator) reflects the impact of EL (predictor) on the EGIWB (outcome) may be influenced by the amount of EGK (moderator). As a result, we advance our following hypothesis.

Hypothesis 5: EGK moderates the indirect relationship between EL and EGIWB. The indirect association is stronger for those with high green knowledge than for those with low green knowledge.

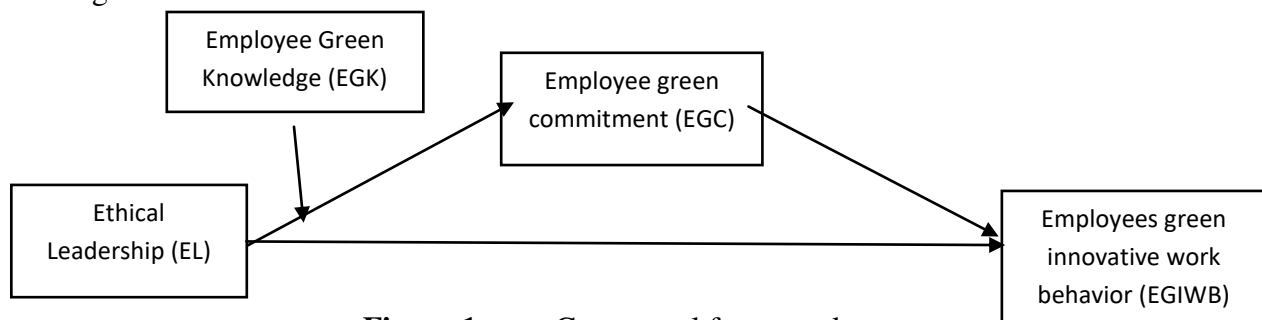


Figure 1 Conceptual framework
Effect of EL on EGC and EGIWB with the moderating role of EGK

Methodology

This research is conducted in the manufacturing sector with an aim to identify the impact of EL to extend green innovative behavior in employees. Data is collected from full-time workers employed in those manufacturing firms. Our data collection is based on manufacturing industry-

related companies located in the main cities of Pakistan with more economic and business activities. The aim is to target those companies pursuing green activities and contributing towards nature saving.

A non-probability convenience sampling technique was used to collect the data from the targeted employees working in particular companies. Convenient sampling was used because participants are difficult to access especially the COVID-19 breakout in Pakistan severely hinders the direct interactions. Data was collected through a self-administered, paper and pencil survey in two-time lags with a gap of two weeks. The purpose of this time-lagged approach is to reduce the impact of common method variance (Brannick, Chan, Conway, Lance, & Spector, 2010; Conway, Lance, & Psychology, 2010). In time 1 the respondents were asked to answer the demographic question and rate their responses on EL, EGK. In the end, a special code was used that include the initials of the respondents along with the last four digits of their cell number. That code is used to match the respondents of time 1 and time 2. In time two respondent has to rate their response on their level of green commitment and green innovative behavior. Both surveys include an introductory paragraph that ensures the full privacy and confidentiality of the data and anonymity of the respondents. Moreover, it includes that participation in this survey is voluntary, and results obtained from this data will be used only for research purposes.

In time 1 the questionnaire was distributed among 600 full-time employees out of which 498 responses were filled and returned. After two weeks the time 2 survey was conducted among those 498 respondents who have completed the 1st survey. We received 385 responses after excluding missing data and pattern responses we get the 359 valid responses that are further used for the analysis.

Measurement scale

This research measured the responses on the study's variable using a five-point Likert scale ranging from strongly disagree (1) to strongly agree (5). The responses were taken on an already developed scale. The questionnaire was developed in the English language as English is the official language of communication in Pakistan.

Ten item scale of EL was used and adapted from (Brown, Treviño, Harrison, & processes, 2005) to measure the responses on this construct. A sample item includes “My leader listens to what employees have to say. The internal reliability of the EL scale is 0.85. Scale adopted to measure EGC is from (Wang, 2016), and includes 4-items. A Sample item includes “I am committed to always implement green behaviors at work”. Cronbach alpha reliability of the scale is 0.92. To measure responses on EGK items were adapted from the already developed scale. The sample item includes “know that I buy products and packages that are environmentally safe”. Scale reliability of EGK is 0.89. The construct of EGIWB was measured through an already developed scale of (Aboramadan, 2020) The sample item includes “I generate green creative ideas”. The internal scale reliability of employee green innovative behavior is 0.87. Age, gender, education, and experience have been taken as control variables because they may have a modest impact on outcome variables.

Moreover, discriminant and convergent validity were also measured, AVE score was greater than 0.5 as per the standard recommended by (Fornell & Larcker, 1981) proving the convergent validity of the measures. Moreover, the value of the square root of AVE is greater than the paired correlation showing the discriminant validity of the measures as shown in table 1.

Table 1: Validity and scale reliability

	C.R	AVE	MSV	α	1	2	3	4
EL	0.89	0.53	0.29	0.85	0.73			
EGC	0.92	0.73	0.28	0.92	0.53	0.86		
EGK	0.89	0.67	0.03	0.89	0.18	0.11	0.82	
EGIWB	0.87	0.52	0.14	0.87	0.37	0.39	0.08	0.72

1= EL, 2=EGC, 3=EGK, 4=EGIWB

Results

Preliminary analysis

To check the multivariate and univariate outliers in the data, the standard of Mahalanobis distance and interquartile ranges were used (Tabachnick, Fidell, & Ullman, 2007). The results indicate that no outlier exists in the data. Table 2 represents the means, standard deviation, and correlation estimates of the studied variables. Correlation results indicate that EL was positively and significantly correlated with EGC ($r=0.49$, $p<0.01$) and EGIWB ($r= 0.31$, $p<0.01$). EGC is positively and significantly correlated with EGIWB ($r= 0.35$, $p < 0.01$). Within demographic variables, only gender has a positive and significant relationship with main studies variables.

Table 2 Descriptive Statistic and Correlations Analysis

	M	S.D.	1	2	3	4	5	6	7
Age	3.23	0.70							
Gender	1.23	0.41	-0.005						
Education	1.56	0.52	-0.81	0.25**					
Experience	3.02	0.83	0.55**	0.04	-0.03				
EL	3.44	0.79	-0.27	-0.37**	-0.04	-0.04			
EGC	3.65	1.04	0.45	-0.18**	-0.07	0.05	0.49**		
EGIWB	4.05	0.78	0.02	-0.11*	-0.01	0.01	0.31**	0.35**	
EGK	2.88	1.14	-0.03	0.03	0.33	-0.01	0.17**	0.11*	0.07

Note: N=359

* $p < 0.05$ ** $P < 0.01$

Confirmatory factor analysis (CFA)

To evaluate the measurement model, factor analysis was done using AMOS version 23. Model fit and adequacy were assessed through the following three indices CMIN/DF, Tucker–Lewis Index (TLI), Comparative Fit Index (CFI), and Root-mean-square error of approximation (RMSEA) were used (Byrne, 2001). As per the standard, threshold values of confirmatory fit indices (CFI) and Tucker-Lewis index (TLI) are 0.90 and for RMSEA it must be below 0.08 representing good model fit (Hair, Anderson, Babin, & Black, 2010; Kline, 2011). Model fit statistics for four-factor model were found appropriate but not good fit for all indices (CMIN/DF

= 2.50, CFI = 0.92; TLI = 0.92, RMSEA = 0.065). Model fitness was improved by removing the low factor loading items (three items of EL were removed). The model fit indices were significantly improved, and all indices were in acceptable range (CMIN/DF = 2.02, CFI = 0.95; TLI = 0.95, RMSEA = 0.054). One alternative model (Bentler & Bonett, 1980) was analyzed to determine the good fitness of the proposed model. EL, EGK, EGC, EGIWB items are merged as one single construct. Result of CFA shows the poor statistics of the indices (CMIN/DF = 11.61, CFI = 0.45; TLI = 0.40, RMSEA = 0.17) showed that proposed four-factor model is the good fit model. Further details of CFA analysis are reported in Table 3.

Table 3. Model Fit

Model	χ^2	df	CMIN/df	CFI	TLI	RMSEA
Four Factor model (EL, EGC, EGIWB, EGK)	616.06	246	2.50	0.92	0.92	0.065
Good Fit Four Factor model (EL, EGC, EGIWB, EGK)	370.56	183	2.02	0.95	0.95	0.054
One factor (merged EL, EGC, EGIWB, EGK)	2926.72	252	11.61	0.45	0.40	0.172

Hypothesis testing

To statically analyze the hypothesized relationship, we used Hayes PROCESS macro by using SPSS v25. The result for the direct, indirect, moderation, and moderated mediation paths were analyzed through model 7 of process macro. The regression analysis in table 4 shows that there is support to hypothesis 1 postulated that EL would be positively related to EGC. The statistical results show that EL is positively and significantly correlated with EGC ($\beta = 0.283$, S.E (0.131), $p < 0.05$). therefore, the results show support to hypothesis 1 and hence accepted it. Hypothesis 2 posits that EGC is positively and significantly related to EGIWB. The result of regression analysis in model 2 shows support to hypothesis 2 such that ($\beta = 0.185$, S.E (0.04), $p < 0.001$) showing that EGC is positively and strongly correlated with EGIWB. Hence hypothesis 2 is accepted.

Model 1 in table 4 shows support to the presence of moderating effect of EGK. The regression results show that EGK moderates the relationship between EL and EGC showing that ($\beta = 0.103$, S.E (0.04), $p < 0.05$) the EGK positively moderates the relationship between EL and EGC. Such that in presence of EL, employees having good green knowledge will show more green commitment towards the environment. To generate the plot for visualization of interaction process macro was carried out at 95% confidence interval. The moderation graph shown in fig 2, depicts the combined effect of EL and EGK with simple slop analysis.

Table 4 Regression Results (Main effects and moderation)

	B	Se	95% Confidence interval (CI)	
			LLCI	ULCI
Model 1: mediator (EGC) variable model				
EL	0.283*	0.131	0.02	0.54
EL × EGK	0.103*	0.04	0.15	0.18
Model 2: Outcome (EGIWB) variable model				
	0.185***	0.04	0.1	0.26

EGC

Notes: n = 359 **, EGIWB= Employee green innovative work behavior, EGC= Employee Green Commitment, EGK= Employee green knowledge

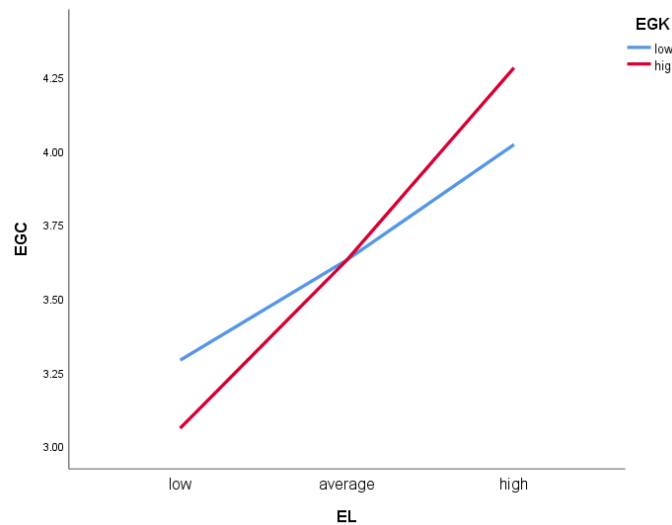
* $p < .05$, ** $p < .01$, $p < 0.001$

For mediation analysis of hypothesis 3 which posits that EL has a positive relationship with EGIWB via EGC, researchers follow bootstrapping method of process macro at a 95% confidence interval (Hayes & Preacher, 2010). As shown in Table 5, the mediation of EGC was significant at 10,000 random samplings with 95% confidence interval with no zero between upper- and lower-class interval that shows the acceptance of hypothesis 3.

Table 5. Test of Direct and indirect effect

Effects	Coefficient(S.E)	95% confidence interval (CI)
EL → EGC → EGIWB		
Direct Effect	0.18(0.05)	[0.89,0.28]
Indirect Effect	0.11(0.27)	[0.05, 0.15]

n = 359



To test for moderated mediation analysis as proposed in hypothesis 5, Preacher, Rucker, and Hayes (2007b) method was used, and analysis was done through process macro, results show non zero class intervals for a low and high level of moderation. The results (Table 6) show that the confidence interval of the indirect effect of EL on EGIWB through EGC didn't include zero when EGK was low (0.04, 0.15) and high (0.08, 0.25). Moreover, the index of moderated mediation is 0.025 and its confidence interval didn't include zero (0.002, 0.583). Seemingly the statistical results show that EGK strengthens the relationship between EL and EGIWB thus supporting hypothesis 5.

Table 6: Moderated Mediation

Independent	Mediator	Level of moderator	Conditional Indirect effect	95% confidence interval (CI)
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EL	EGC	Low EGK	0.09(0.02)	[0.04, 0.15]
		High EGK	0.13(0.04)	[0.08, 0.25]

Outcome: EGIWB

* EGIWB= Employee Green Innovative Behavior, EGC= Employee Green Commitment

EGK= Employee green Knowledge

Discussion and conclusion

The purpose of this research study is to investigate the mediating role of EGC between the relationship of EL and EGIWB. Moreover, we also investigated EGK as a boundary condition on the mediation of EGC between EL and EGIWB. Our research also backs with the existing literature available on the association between EL and employee commitment (Abuzaid, 2018; Ponnu & Tennakoon, 2009), as the association between EL and EGC is also confirmed by this study. Second, the findings of our study are in line with previous research on the association between employee green commitment and pro-environmental behaviors (Ansari et al., 2020; Hameed et al., 2022; Safari et al., 2018). Employees are more likely to engage in green innovative behaviors when top management values EGC (Luu, 2018). Employees feel more responsible to demonstrate EGIWB because of EL's strong commitment and severe norms and regulations for environmental protection.

Third, this study confirms that EGC plays a mediating effect between EL and EGIWB. This study's findings are in line with those of previous research investigations (Hameed et al., 2022; Khan et al., 2019), where it was discovered that EL has a major impact on pro-environmental behaviors both directly and indirectly through some mediation mechanisms. Fourth, we don't know anything about EGK's moderating effect. Our findings add to the body of knowledge about EGK by revealing its moderating effects. This research introduces EGK as a moderator to examine its effect on the association between EL and employee green commitment. The findings of this study backed up our hypothesis that EL has a different impact on EGC depending on whether they have a high or low EGK. Based on EGK, employees in the presence of EL display green commitment such as using energy-efficient equipment, keeping an eye on kitchen waste, electricity costs, and taking public transportation instead of driving. Furthermore, in the presence of EL, an employee with green knowledge shows stronger green commitment to the environment's sustainability and protection than those with poor green knowledge.

Lastly, another significant finding of this study is that EGK improves the positive link between EL and EGC, and EL's indirect positive influence on EGIWB via EGC. So far as we know, this study is the first to show that EGK interacts with EL to affect EGC, which then influences EGIWB. Our findings are consistent with previous studies, implying that EGK is a key element in enhancing EGC and employee green and pro-environmental behaviors (Zhang & Chabay, 2020) and that it may interact with EL to influence both EGC and EGIWB. SLT's logic (Bandura, 1986) is also important in understanding these results. According to this theory, employees try to copy their role models' conduct, and as a result, they are more devoted to environmental sustainability and exhibit green innovative work behaviors. The above reasoning may describe why this research discovered that EGK enhances EL's positive influence on EGC. Furthermore, it also suggests that EGK enriches EL's indirect positive influence on EGIWB through EGC. Additionally, our findings added to the current literature on the indirect effect of EL on EGIWB via EGK as mediation.

Limitation and future research

Even though our research has substantial implications for practice and theory, it is not without flaws. For instance, the focus of this research is limited to the manufacturing sector, and the conclusions have generalizability and validity concerns. Studies in the future should focus on the hospitality industry so the issues related to generalizability can be minimized. This study incorporated EGC as a mediator between the relationship of EL and EGIWB, in the future other green variables, might be considered to advance green literature. Furthermore, studies in the future should include employee green awareness as a moderator between the relationship of EL, EGC, and EGIWB. Lastly, this research model should be tested in other developed countries with diverse cultures for a better and improved understanding of this research model.

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