

ORIGINAL ARTICLE

Stimulating environmental performance through green human resource practice: Does green transformational leadership matter?

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ABSTRACT

Businesses are essential in nations' economic development, green practice, and environmental performance, particularly in emerging countries. Such economic development needs environmental-friendly business practices to attain higher environmental performance goals of businesses. Nevertheless, a plethora of studies centered on the direct effects of environmental management initiatives (EMI) and green innovation practices (GIP) on environmental performance (EP). Still, the direct and indirect impacts of green human resource practices (GHRPs), green transformational leadership (GTL), and other constructs were ignored. This study analyzes the direct and indirect relationships of GHRPs, EMI, and GIP toward improving EP. In addition, the study examines the moderation role of GTL between GHRPs and EP under the theoretical framework of ability, motivation, and opportunity (AMO) theory. Empirically, this present study utilized a survey method to assemble data from 535 business entities in South Africa. The analysis showed that GHRPs directly and significantly influenced EMI, GIP, and EP. EMI and GIP also directly and significantly influenced EP. Finally, GTL significantly affects the interplay between GHRPs and EP. This study's results provide a managerial and theoretical contribution to how GHRPs, EMI, GIP, and GTL facilitate a corporate EP. The present paper enriches the theory of AMO by incorporating new variables such as GHRPs, GTL, EMI, and GIP, towards enhancing EP. Also, this study provides fresh insight into the impact of the mediation role of EMI between GHRPs and EP, mediation role of GIP between GHRPs and EP, thereby contributing to extant literature. The study emphasizes the need for businesses and managers to apply green human resource policies to make employees more committed to environmental sustainability, promoting EP in the long term.

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KEYWORDS

green process innovation; AMO theory; environmental management initiative; green innovation practices; environmental performance

1. Introduction

Recently, the climate change has become a severe global problem that is probably one of the highest challenges confronted by businesses and humanity (Naz et al., 2021; Wiredu et al., 2023). Institutions have been facing intense pressure from shareholders, customers, and the government to reduce the environmental effect created by their firm actions (Gunarathne et al., 2021). In addition to this challenge, increasing concern in ecological issues has compelled firms to invest in eco-friendly practices to improve its green product innovation and green process innovation, as predicted via a set of green innovation practices (Banwo and Du, 2019; Maqsood et al., 2022). Since any innovation cannot be separated from the participation of employees, green innovation practice (GIP) is significantly related to green human resource practices (GHRPs) (Anwar et al., 2020). Thus, GHRPs is essential for firms to attain their corporate environmental objectives and enhance their environmental performance (EP) (Tang et al., 2022).

Moreover, Iqbal et al. (2021) observed that implementing GHRPs like green hiring, green training, and development is more important when aiming to impact the environment positively. GHRPs positively influence a company's green performance goals, environmental management initiatives (EMI), and EP (Imran et al., 2021; Wen et al., 2022). The EMI and GHRPs enhance workers' ability, motivation, and opportunities to exercise green innovation activities. These practices signify the business' positioning regarding environmental safety (Shahriari et al., 2019). Furthermore, extant studies have shown positive impacts of EMI and GHRPs on multiple results like worker green behaviors and green innovation practices (Ababneh, 2021; Lin et al., 2021). Although the literature describes the impacts of GHRPs on organizational results at the personal and institutional level, how these GHRPs cooperate with EMI and GIP towards enhancing a firm's EP is relatively unknown (Afum et al., 2021). Besides, green transformational leadership (GTL) refers to a leader who endorses a firm's environmental concerns, inspires, arouses, and encourages the followers to achieve the firm's environmental objectives, allowing them to enhance the EP of the firm (Tosun et al., 2022). Though extant studies explain the positive effects of GTL on institutional results at the firm and personal levels, how GTL cooperates with GHRPs towards improving a firm's EP is comparatively unknown (Begum et al., 2022). Together, GHRPs will likely provide the essential mechanism and resources to promote EMI, GIP, and GTL. Then, these initiatives will help improve firms' EP, thereby enhancing ecological stability.

We apply the theoretical lens of the ability, motivation, and opportunity (AMO) theory. Al-Shahwani (2020) and Mutunga (2020) suggest that the AMO theory is a human resource development process that is capable of improving workers' ability, motivation, and dedication through education, remuneration, and performance supervision as the opportunity to section knowledge and worker involvement towards problem resolution to highlight the higher duty of task accomplishment and decision making. In this research framework, GHRPs enhance employees' ability via green hiring, green training, and development. Therefore, it is against this backdrop that this study utilizes the AMO theory as the study's backbone to investigate how GHRPs cooperate

with EMI, GIP, and GTL to improve employees' artistic, innovative behavior (Yu et al., 2021) and towards enhancing a firm's EP. Past studies have centered on the direct effects of EMI and GIP on EP, yet the impacts of GHRPs, GTL, and other constructs were ignored. Therefore, this study aims to analyze empirically the following research questions: (1) the influence of the direct and indirect relationships of GHRPs, GTL, EMI, and GIPs toward EP, (2) the mediation role of EMI between GHRPs and EP, (3) the mediation role of GIP between GHRPs and EP, and (4) the moderation role of GTL on the relationship between GHRPs and EP.

This study adds to the existing studies a number of contributions in the following ways. First, theoretically, the present study enriches the theory of AMO by incorporating new variables such as GHRPs, GTL, EMI, and GIP, towards enhancing EP. Secondly, this study provides fresh insight into the impact of the mediation role of EMI between GHRPs and EP mediation role of GIP between GHRPs and EP, thereby contributing to extant literature. Thirdly, theoretically, the moderation role of GTL in the association between GHRP and EP is significant and enriches the AMO theory by providing fresh insight into the effects these variables have on organizational performance. Lastly, the empirical analysis will serve as a reference for SMEs, government, and business organizations in decision-making and policy formulation to enhance EP in South Africa.

The rest of the study is systematized as follows: Section 2 gives the theoretical framework and hypothesis development. Section 3 focuses on the methodology adopted. Section 4 expounds on the findings grounded on partial least squares structural equation modeling (PLS-SEM) analysis. Section 5 exhibits this study's interpretation, leading to theoretical and managerial consequences, and the conclusion and future study.

2. Theoretical underpinning and hypotheses development

2.1. The ability, motivation, and opportunity (AMO) theory

Al-Shahwani (2020) and Mutunga (2020) describe the AMO theory from the perspective that human resource practices that are captious to improving the motivation, ability, and dedication of workers via education, reimbursement, and performance supervision as the opportunity to section knowledge and worker involvement in problem resolution to highlight on the high-level of duty accomplishment and decision making. AMO gives a good comprehension of human resource administration and the performance of workers and companies (Tay, 2017). Trained and skilled workers feel inspired and freely further, heightening their degree of dedication (Hashim, 2020; Tay, 2017). Hence, green human resource applications like green inventive staffing and selection, advanced performance supervision, and advanced compensation might improve workers' ability, motivation, and opportunity to attain firms' green objectives (Amrutha and Geetha, 2020). Therefore, this research employed the AMO theory as the theoretical background because it establishes a better comprehension between GHRMPs and the performance of workers and firms.

2.2. Green human resource practices and environmental performance

In light of the AMO theory, by reshaping the green organizational tactics, companies also reshape human resource practices to manage the related issues to enhance firms' environmental performance (Makhloufi, Laghouag, et al., 2022). GHRPs include green staffing and selection, green education, green performance supervision, and green compensation (Shahriari et al., 2019). GHRPs are crucial

to improve firms' services and affect, minimize prices, and establish an extra sustainable labor experience (Iqbal et al., 2021). Furthermore, environmental management decisions, environmental communication practices, green hiring, and green training development are the primary reason for firms' green product innovation, green process innovation, and success, which could be foretold through appropriate inference of GHRPs which target enhancing firms' EP (Q. Yang et al., 2020; Wen et al., 2022). In reply to the environmental pressure, firms are concentrating on implementing GHRPs, influencing numerous results like green institutional commitment and EP (Sobaih et al., 2020). The ability and trained workers feel motivated and volitionally go further to optimize their level of obligation towards achieving firms' EP. Manning et al. (2018) explained EP as the dedication of companies to safeguard the ecology and to show assessable functioning limits that are inside the proposed parameters of the environmental upkeep. Thus, the proposed hypothesis is as below:

H1: GHRPs are positively related to EP.

2.3. GHRPs and environmental management initiatives

Environmental management initiatives refer to the firm's program or strategy for dealing with environmental-related issues (Solovida and Latan, 2017). The achievement of a firm's program or system needs employees to understand, support, and put effort into their task fulfillment. With the logic of AMO, GHRPs aid in making a green employee that appreciates and comprehends the green environmental management initiatives of the company (Ercantan and Eyupoglu, 2022). Research recommends that by integrating green innovative human resource practices with environmental management initiatives, firms could safeguard the environment against any harm (Tooranloo et al., 2017). Moreover, through GHRPs, firms can urge employees to learn environment conservation skills and focus on environmental matters through which they might achieve their environmental objectives (C. Li et al., 2022; Yong et al., 2020). More so, Papagiannakis and Lioukas (2018) observed that GHRPs are significant in motivating workers to partake in green environmental management initiatives, which are associated with the business vision of the institution. Therefore, GHRPs significantly promote EMI in generating environmental desire (Feng et al., 2020; Shahriari et al., 2019; Yong et al., 2020). Thus, the proposed hypothesis is as below:

H2: GHRPs are positively related to EMI.

2.4. GHRPs and green innovation practice

Green innovation practice refers to the important practices and behaviors to attain institutional green goals such as green product innovation and green process innovation (Xu et al., 2020). The "green" goals of firms force them to establish numerous tactics in green practices like green material purchasing, green product design, green manufacturing, and recycling, which heightens the possibility of firms being advanced and green simultaneously (Lyon and Maxwell, 2020). Firms that adopt GHRPs naturally have well green trained and skilled employees that can fulfill the green innovative practice in goods and processes that positively target creation, reduce the dangerous effects on the environment, and enhancing GIPs (El-Kassar and Singh, 2019). Iqbal et al. (2021) utilize the AMO theory to suggest that GHRPs impact workers' ability and motivation toward green objectives and offer opportunities to attain a firm's green innovation practice objectives. Also, GHRPs improve employees' innovation performance towards the environment through activities

like green production, green purchasing, green training, and development, thus attaining the firm's green innovative practice goals (Albort-Morant et al., 2018). Delmas and Pekovic (2018) said that empowered workers feel an inner motivation to adopt GHRPs, which drive them to engage in positive green innovative practices and work-related outcomes like job satisfaction. Hence, firms' GHRPs knowledge and creative behavior improve employees' green innovation practices (Begum et al., 2022). Thus, the proposed hypothesis is as below:

H3: GHRPs are positively related to GIP.

2.5. Environmental management initiatives and environmental performance

EMI aims to develop environmental responsiveness in employees and make them conscious of how their attitudes influence environmental performance (Banwo and Du, 2019). EMI concentrates on the employees' environmental behavior that affects environmental performance (Papagiannakis and Lioukas, 2018). According to Hartmann and Vachon (2018), environmental management decisions and environmental communication practices are key EMI strategies and techniques that empower and motivate employees to support firms' programs that enhance the EP of workers in an organization. A study suggests that EMI affects employees' behavior, such as recycling and green manufacturing targeting to improve environmental performance (Papagiannakis and Lioukas, 2018). Additionally, EMI, such as training employees on environmental policies, mixing a scheme of rewards for environmentally friendly employees' behavior, and focusing on green production, enhances EP (Anwar et al., 2020). Based on the AMO theory, employees' feeling of empowerment, ability, and motivation improves their preparedness to support the EMI of the business towards achieving EP (Masri and Jaaron, 2017). Studies by Zaid et al. (2018) and Anwar et al. (2020) affirmed that EMI results in higher efficacy, lower costs, and thus enhanced staff involvement, which positively affects EP. Hence, it can be concluded that EMI significantly relates to EP. Thus, the proposed hypothesis is as below:

H4: EMI is positively related to EP.

2.6. Green innovation practices and environmental performance

Green innovation practices (GIP) like green product innovation and green process innovation by firms are essential to attaining institutional green goals in enhancing EP (Iqbal et al., 2021). Thus, the achievements of a firm's EP are grounded upon the employees' passion for the environment, like engagement in the reprocessing program and green innovation practices (Muisyo and Qin, 2021). Firms can encourage workers to be green by assigning green activities like the ban on pouring poisonous liquid into nearby waterways, teaching workers to handle dangerous materials carefully, and executing all other forms of GIP that target enhancing EP (Wang et al., 2021). GIP promotes firm culture and stimulates ecological-oriented employee behavior towards achieving EP (Makhloufi et al., 2021). Again, the green goal of firms forces them to establish many GIP approaches in the form of green goods and green processes, which heightens the possibility of firms being innovative and also green at the same time, which leads to EP (Jyoti, 2019). Some previous studies observed that EP happens when an employee senses pride, pleasure, and a sense of achievement because carrying out environmentally-friendly acts like reprocessing cans and paper, preserving energy, and consuming green products as a result of green innovation practices (Anwar et al., 2020; Muisyo and Qin, 2021; Pham, 2021). Thus, the proposed hypothesis is as below:

H5: GIP is positively related to EP.

2.7. Mediation role of EMI between GHRPs and EP

The effects of GHRPs on environment-related results are likely to be indirect (Amjad et al., 2021), so we anticipate that the relationship between GHRPs and EP will be mediated by EMI. EMI plays a vital role in transforming GHRPs into practices that result in EP (Imran et al., 2021). Specifically, in light of GHRPs, EMI motivates employees to engage in green initiatives and techniques such as recycling papers and cans, green purchasing, training employees on environmental policies, and waste reduction to protect and improve environmental performance (D. Das, 2018; Zhao et al., 2023). Based on the AMO theory, employees' feeling of empowerment, ability, and motivation improves their preparedness to support EMI of the firms thereby mediating between GHRPs and EP (Masri and Jaaron, 2017). EMI can impact individual employees' consciousness of environmental safety and improvement, mediating GHRPs and EP (Jamil and Johari, 2020). Moreover, in light of the AMO theory, firms adopt EMI such as a reward management policy whereby green pay together with a reward system is planned to entice, maintain, and encourage workers to contribute to the firms' environmental goals and thus mediate the relationship between GHRPs and EP (Jerónimo et al., 2020). Therefore, the proposed hypothesis is as below:

H6: EMI mediates the relationship between GHRPs and EP.

2.8. Mediation role of GIP between GHRPs and EP

Makhloufi, Laghouag, et al. (2022) enunciated that the firm's GIP and proactive strategies concentrating on enhancing environmentally friendly technologies can improve their EP. According to the AMO theory, workers' green behavior is significantly influenced via GIP, which mediates between GHRPs and EP when employees feel capable, motivated, and high about green values (Uddin, 2022). An ineffective GIP and GHRPs culture may make environmental strategy reactive instead of proactive, possibly increasing the danger of potential environmental catastrophes and damaging the firm's reputation (El-Kassar and Singh, 2019). Also, when workers get engaged in GIP (green product innovations, green process innovations, etc.) and GHRPs such as green hiring and green training development, they will become much more zealous on the environment and thus put in additional effort beyond their fundamental work obligations and eventually contributing towards the EP of the firm. Since GIP and GHRPs in a firm can be reinforced through a proactive environmental approach and weakened via a reactive environmental system, we deduced that GIP mediates the relationship between GHRPs and EP. Thus, the proposed hypothesis is as below:

H7: GIP mediates the relationship between GHRPs and EP.

2.9. Moderation role of green transformational leadership on the relationship between GHRPs and EP

GTL is explained as the behaviors of leaders who can inspire cohorts to attain environmental objectives and motivate cohorts to perform beyond the anticipated heights of EP (Sun et al., 2022). Tosun et al. (2022) described GTL as leaders who endorse a firm's environmental concerns, inspire, arouse, and encourage the followers to achieve the firm's environmental objectives, allowing them to improve the EP of the firm. GTL aims to supervise and monitor GHRPs that target protecting the environment and enhancing EP (Afum et al., 2021). So, GTL looks at green innovation in goods and

processes that target creation while reducing the harmful effects it might have on the environment (Amjad et al., 2021). Studies demonstrated that GTL collaborates with GHRPs in adopting environmental policies and practices that improve EP (Mansoor, Farrukh, et al., 2021; Priyadarshini et al., 2023). For instance, Joshi and Dhar (2020) stated that GTL is directly involved in activities like green hiring, green training, and green product of a firm. Hence, GTL moderates and influences the actions of GHRPs towards protecting the environment. The firms' innovative green campaigns and initiatives, as well as the supervision of environmental activities of GHRPs by the GTL, lead to EP (Afum et al., 2021). Thus, the proposed hypothesis is as below:

H8: GTL positively moderates the relationship between GHRPs and EP.

Figure 1 provides a graphical representation of the research conceptual framework and hypotheses.

3. Methodology

3.1. Research method and sampling

The data for this research were assembled from small and medium-sized enterprises (SMEs) and manufacturing and construction companies in Johannesburg, South Africa. South Africa's "Environmental Protection Policies" were further modified and announced in 2010, forcing every local and overseas firm to have a comprehensive environmental impact assessment. Compared to other cities in South Africa, Johannesburg is comparatively innovative in executing the green economy characteristics into progressive policies and agendas. Investment in clean productions, natural resources, and expert green employees have already been concentrated in Johannesburg. Most South African industries adhere to the "Environmental Protection Policies" and the "State Environmental Protection Administration", which allow them to partake in green initiatives and environmentally friendly activities (Hamann et al., 2017; Meyer, 2018; Mubanga and Kwarteng, 2020).

The self-administered questionnaire method was utilized to assemble the data for the study. Managers and supervisors directly associated with the execution of environmental sustainability were the target populace. Thus, managers and top officials with adequate knowledge of GHRPs,

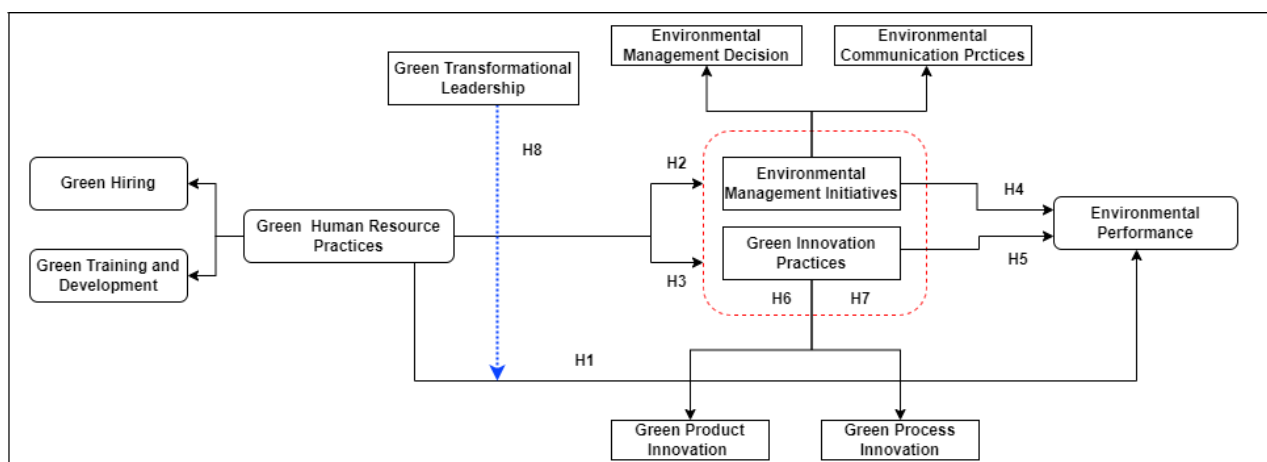


Figure 1. Research conceptual framework and hypotheses.

EMI, GIP, GTL, and EP were requested to complete the questionnaire. Regarding generating the data, the authors used three months (April 2022 through June 2022) to assemble responses from the partakers. Before distributing the questionnaires, the submissions and recommendations from manufacturing experts were sought to guarantee that the measures used in this study were valid and reliable. The questionnaires were organized based on previous literary works. The questionnaires for the study were initially written in English. Specialists in this field were consulted and recommended that the survey questionnaires be translated from English to Standard Zulu and Afrikaans language. When the questionnaires were disseminated, the authors included a consent form and the research objectives for the respondents. The study's partakers were guaranteed that their feedback would be treated with the utmost confidentiality. This study does not need ethical approval because it does not include any clinical or animal experiments. Additionally, the study data was assembled anonymously, and the respondents answered the questions willingly.

This study initially chose 40 firms, and the reason for this is that these firms' activities, directly and indirectly, affect the environment; however, these firms are eager to obey the environmental protection laws to safeguard the environment. Altogether, 585 managers and top officials with adequate knowledge of GHRPs, EMI, GIP, GTL, and EP were contacted to respond to the questionnaire through an online survey. At the final data collection procedure, we received 535 valid responses, indicating a high response rate of 91.5%. The survey suggests that $n = 375$ (70%) comprised males while $n = 160$ (30%) were female. The findings indicated that most respondents are between 25 to 45 years (average = 33.5 years, $SD = 0.925$). Regarding the educational background of the workers, $n = 255$ (48%) had a bachelor's degree; also, $n = 215$ (40%) had a master's degree, and $n = 65$ (12%) had other forms of education. Furthermore, the data concerning working experience, we found out that $n = 265$ (50%) of the participants had 5–9 years of working experience, while $n = 185$ (34%) had 1–4 years of experience and also $n = 85$ (16%) had more than 10 years working experience. In the business category, 21% of the respondents specified they mainly deal in automotive, 25% are in pharmaceuticals, 32% produce plastics and rubber, 12% are technology and communication, and 10% are from other companies. Meanwhile, we found that 58% of the employees worked permanently, 30% worked on a contractual basis, and 12% were also internship-based.

3.2. Measurements

The questionnaire was structured into two parts. The first part collected the data on participants' age, sex, educational background, work experience, business category, and employees' contract terms. The second part of the questionnaires included measuring scales adapted from earlier literary works, and the details are displayed in **Table 1**. The questionnaire comprised of three high-order constructs, which comprise Green Human Resource Practices (Green Hiring (GH) and Green Training and Development (GTD)), Environmental Management Initiatives (Environmental Management Decision (EMD), and Environmental Communication Practices (ECP)), and Green Innovation Practices (Green Innovation Product (GIP) and Green Innovation Process (GIP)). Furthermore, before distributing the questionnaires for feedback, the suggestions and recommendations from manufacturing specialists were sought to guarantee that the measures used in this research are valid and reliable. The study's measuring constructs employed a 5-point Likert scale (1, strongly disagree; 2, disagree; 3, neutral; 4, agree; and 5, strongly agree).

Table 1. Detailed measurement items

Constructs	Code	Items	Citation
GHRPs			(Lyon and Maxwell, 2020; Yassin et al., 2021)
Green Hiring	GH1	Our firm employs people who have ethics regarding the protection of the environment	
	GH2	I frequently find myself contemplating on ethical issues	
	GH3	Our firm employs people who have good knowledge regarding environmental safety	
	GH4	Our firm is concerned about employees' behavior towards the environment	
Green Training and Development	GTD1	I volunteer for environmental activities in my firm	
	GTD2	I love conserving energy and engagement in recycling activities and training	
	GTD3	I perceive a sense of duty to support my firm in protecting the environment through workshops and seminars	
	GTD4	I love the effort and time it takes to engage in environmental behavior practices	
Environmental Management Decision			(Muisyo and Qin, 2021; Siddiqui and Siddiqui, 2020)
	EMD1	Our firm urges its employees to partake in voluntary events	
	EMD2	Our firm targets at sustainable development, which considers future generations	
	EMD3	Our firm urges its employees to adopt environmental-friendly behavior	
	EMD4	Our organization respects and endorses the protection of biodiversity	
	EMD5	Our firm encourages us to control our consumption patterns to guarantee sustainable growth	
Environmental Communication Practices			(Muisyo and Qin, 2021; Wang et al., 2021)
	ECP1	People must be informed about the environment via mass media (television, newspapers, journals, and others)	
	ECP2	I think every individual has the obligation to play their role in protecting the environment	
	ECP3	People must live in harmony to attain sustainable growth	
	ECP4	I am worried about future environmental quality	

Table 1. (Continued)

Constructs	Code	Items	Citation
Green Innovation Product			(Makhloufi, Laghouag, et al., 2022; Z. Yang and Lin, 2020)
	GIN1	Our company invests in clean technologies and renewable energies	
	GIN2	Our firm decreases the environmental effects of its products/service	
	GIN3	Our firm encourages green purchasing and recycling of used products	
	GIN4	Our firm has conserved source of energy consumption	
Green Innovation Process			(Iqbal et al., 2021; Makhloufi, Laghouag, et al., 2022)
	GRIN1	Our company disposes of waste in an environmentally friendly manner	
	GRIN2	Our company business processes have been transformed into paperless	
	GRIN3	My company has significantly reduced its solid wastes generation	
	GRIN4	Our firm has adopted renewable sources of energy	
	GRIN5	Our firm encourages us to turn off electronic gadgets to conserve energy	
Green Transformational Leadership			(Afum et al., 2021; Amjad et al., 2021)
	GTL1	I feel competent in dealing effectively with environmental tasks	
	GTL2	I perform tasks that are expected of me in environmentally friendly ways	
	GTL3	I frequently reflect on the ethical aspects of my decisions toward the environment	
	GTL4	I perceive a sense of duty to support my firm in protecting the environment	
	GTL5	I think about the ethics of my activities towards the environment virtually everyday	
Environmental Performance			(Jamil and Johari, 2020; Tu and Wu, 2021)
	EP1	I think our firm can succeed in protecting the environment	
	EP2	Our firm could find out artistic answers to environmental problems	
	EP3	Our firm can achieve most environmental goals	
	EP4	I think our firm can overcome the environmental problems	
	EP5	I think we can perform effectively on the environmental missions of my firm	

3.3. Control variables

As recommended by erstwhile studies, this study incorporated control variables that evaluate respondents' gender and educational background concerning corporate EP. These studies indicate that constructs such as employees' age and educational background affect the behaviors they engage in to promote corporate EP (Mansoor et al., 2021; Neumann, 2020; Wang et al., 2021). This study also analyzed these control variables to obtain an accurate result estimation and reduce biases.

4. Results

4.1. Measurement reliability and validity

The reliability of the measurements of this study was measured with the help of Cronbach's alpha (CA) and composite reliability (CR). **Table 2** represents that each construct's CA and CR values were >0.70 . From Table 2, all the construct's CR coefficient values range from 0.874 to 0.938; CA coefficient values range from 0.827 to 0.889, which is significantly above the threshold of 0.7 representing satisfactory reliability. Again, the potential structure of all average extracted variance (AVE) must be ascertained to authenticate the factors' inner consistency (Rehman Khan and Yu, 2021). From Table 2, AVE ranges from 0.503 to 0.643, suggesting that AVE has exceeded the critical value of 0.5 and convergent reliability, validity, and precision are achieved. The square root of the AVE is extracted with the absoluteness value of the correlation of every construct in rows and columns, as shown in **Table 3**. The test of Fornell and Larcker (1981) suggested that the values within the diagonal of each construct signify square roots of AVE should be higher than its column and row, which is the correlations amid constructs, and all AVEs of constructs must be >0.5 . Also, the correlations between the variables are <0.90 , so these results satisfy the criteria concerning discriminant validity.

4.2. Common method bias (CMB)

The likelihood of this research being influenced by common method bias (CMB) at some point cannot be entirely disregarded. So, to prevent the influence of CMB, this study applied Harman's single factor method and individual instructions for all construct and placed them into different parts of the questionnaires to alleviate the contextual effects of responses (Hair, Risher, et al., 2019). Additionally, the authors employed the variance inflation factor (VIF) coefficient to assess the collinearity among variables within this study. Rehman Khan and Yu (2021) and Hair, Risher, et al. (2019) observed that the VIF coefficient should be <5.0 . Hence, Table 2 illustrates that CMB is not serious since the VIF coefficient values ranged from 1.013 to 4.815. The results revealed that CMB is not an issue in this study.

4.3. Heterotrait-monotrait ratio

The HTMT is another important technique for evaluating the multicollinearity and validity of the PLS-SEM model. Tu and Wu (2021) and Hair, Risher, et al. (2019) stated that the HTMT ratio estimates the characteristic of correlations in the model. If the HTMT values are >0.90 , then discrimination will not be applied. Therefore, the HTMT ratio should not be >0.90 (Hair et al., 2020). The outcomes of Table 3 supported all the standard principles established by the previous researchers. Henceforth, the outcomes reveal the HTMT discriminant level support within this study

Table 2. Reliability and validity of the measurements

Constructs	Items	Outer loadings	CA	CR	AVE	VIF
Green Human Resource Practices			0.856	0.887	0.571	
Green Hiring	GHI1	0.834				1.299
	GHI2	0.701				4.815
	GHI3	0.880				3.903
	GHI4	0.778				3.199
Green Training and Development	GTD1	0.704				2.626
	GTD2	0.741				2.943
	GTD3	0.720				2.531
	GTD4	0.714				2.732
Environmental Management Initiatives			0.861	0.888	0.550	
Environmental Management Decision	EMD1	0.833				1.715
	EMD2	0.750				2.261
	EMD3	0.730				2.885
	EMD4	0.876				3.313
	EMD5	0.760				3.531
Environmental Communication Practices	ECP1	0.778				1.929
	ECP2	0.865				1.438
	ECP3	0.823				2.094
	ECP4	0.794				3.964
Green Innovation Practices			0.827	0.938	0.603	
Green Innovation Product	GIN1	0.751				2.599
	GIN2	0.770				3.532
	GIN3	0.804				2.985
	GIN4	0.826				2.835
Green Innovation Process	GRIN1	0.825				1.877
	GRIN2	0.707				2.233
	GRIN3	0.715				3.042
	GRIN4	0.793				3.304
Green Transformational Leadership			0.889	0.915	0.643	
	GTL1	0.760				2.572
	GTL2	0.838				2.814
	GTL3	0.789				2.236
	GTL4	0.777				1.846
	GTL5	0.935				2.046
Environmental Performance			0.832	0.874	0.503	
	EP1	0.707				1.897
	EP2	0.851				1.400
	EP3	0.833				1.013
	EP4	0.806				3.920
	EP5	0.795				3.204

Table 3. Heterotrait-monotrait ratio (HTMT)

	EMI	EP	GHRP	GIP	GTL
EMI					
EP	0.713				
GHRP	0.694	0.446			
GIP	0.862	0.644	0.709		
GTL	0.846	0.591	0.892	0.675	

since all the construct values are <0.9 .

4.4. Predictive relevance, effect size, and model fit

The co-efficient determination is evaluated through the R^2 . This test reflects the model's ability to predict outcomes, and it also measures the variance in the endogenous variables that all the explanatory parameters can account for. As indicated by Cai et al. (2022), the determination statistical value of 0.19 (weak), 0.330 (moderate) and 0.670 (substantial). The outcome presented in **Table 4** shows that EMI, GIP, and EP can be explained by the predictor parameters with the statistical value of R^2 accordingly by 0.459%, 0.484%, and 0.758%. Moreover, the effect size statistical value is assessed with the F^2 test. The outcome of the F^2 revealed that each regressor in the model ranges between 0.209 and 0.633, which is classified from average effect to large effect as suggested by (Sampene et al., 2022; X. Li et al., 2022). In addition, the Q^2 estimates provide an analysis of the model's predictive relevancy. Thus, all the endogenous parameters should exceed zero (0), which shows that the model has high predictive power. The outcome presented in Table 4 revealed that all the parameters meet this criterion. The co-efficient goodness of fit is evaluated via the standard mean squared $0.071 < 0.080$. Finally, the normed fit index (NFI) indicates $0.813 > 0.080$, which implies that the study data is fit for empirical analysis.

4.5. Hypotheses testing

A partial least square and structural equation model (PLS-SEM) was applied to assess the theoretical, conceptual framework, and hypotheses. The path co-efficient outcomes are attained through examining the structural model. Regarding this research, the authors utilized a resampling bootstrap method to get the T-statistics and original means (β) in the PLS-SEM method. The study data was prepared using 5,000 bootstrapped samples in this inquiry (Hair et al., 2020). The eight hypotheses' path coefficients and the p-value ranges from 0.000 to 0.005, as revealed in **Table 5**. The authors firstly tested the impact of control variables like gender and educational background to

Table 4. Outcome of the saturated model

Constructs	R^2	F^2	Q^2	SRMR	NFI
GHRP	-	0.209–0.633	0.209	-	-
EMI	0.459	0.272–0.445	0.295	-	-
GIP	0.484	0.295–0.539	0.272	-	-
GTL	-	0.295	-	-	-
EP	0.758	-	0.447	0.071	0.813

prevent the issue of bias in this research analysis. The results showed that both gender ($\beta = 0.114$; t -value = 9.132; $p = 0.000$) and educational background ($\beta = 0.203$; t -value = 12.482; $p = 0.000$) of the participants have significant and positive effect on this study model. Thus, this result supported earlier studies that revealed that personal characteristics like gender, educational background, and residence type influence their level of GHRP and EP (Afum et al., 2021; Uddin, 2022). The empirical findings from this study revealed that GHRPs (H1: $\beta = 0.580$; t -value = 25.692; $p = 0.000$) have a direct positive relationship with EP. Also, GHRPs (H2: $\beta = 0.879$; t -value = 158.475; $p = 0.000$) have a direct significant relationship with EMI. More so, GHRPs (H3: $\beta = 0.797$; t -value = 25.728; $p = 0.000$) have a direct positive relationship with GIP. Again, the study results showed that EMI (H4: $\beta = 0.798$; t -value = 51.942; $p = 0.005$) has a direct and positive relationship with EP, indicating that the study hypotheses 1–4 are supported. Similarly, the empirical assessment proves that GIP (H5: $\beta = 0.212$; t -value = 5.769; $p = 0.000$) has a significant direct relationship with EP. Therefore, this result proposes that H5 is supported.

In a mediating model, it is expected that a variable named X is approximated to influence an outcome variable Y via a mediating factor(s) assumed, which is generally mentioned as the mediator (M). Therefore, to assess the mediation effect of EMI in the relationship between GHRPs and EP and also GIP in the connection between GHRPs and EP, the authors tested the significance level of the indirect path by employing the bootstrapping method of the Smart PLS as proposed by Hair et al. (2020). The empirical outcomes from this current study showed that the indirect effect of GHRPs on EP by EMI is statistically significant (H6: $\beta = 0.009$; t -value = 3.139; $p = 0.000$). So, the implication from this result shows that EMI has a mediation effect on the GHRPs-EP association.

Table 5. Hypothesis testing results

Hypothesis		β	t -value	Decision
Control variables				
	Gender	0.114	9.132***	
	Educational background	0.203	12.482***	
Direct relationships				
H1	GHRP-----> EP	0.580	25.692***	Supported
H2	GHRP-----> EMI	0.879	158.475***	Supported
H3	GHRP-----> GIP	0.797	25.728***	Supported
H4	EMI-----> EP	0.798	51.942***	Supported
H5	GIP-----> EP	0.212	5.769***	Supported
Mediation relationships				
H6	EMI -> GHRP -> EP	0.009	3.139***	Supported
H7	GIP -> GHRP -> EP	0.271	4.811***	Supported
Moderation relationship				
H8	GTL*--> GHRP -> EP	0.428	32.307***	Supported

Note: *** denote $p = 0.000 < 0.005$.

Likewise, the study results showed that the indirect impact of GHRPs on EP by GIP is statistically significant ($H7: \beta = 0.271; t\text{-value} = 4.811; p = 0.000$). The inference from this result indicated that GIP has a mediation influence on the GHRPs-EP linkage.

Moderation denotes a condition in which the relationship between two ideas is not invariant and is ascertained through the value of a third variable, the moderator variable. Thus, the moderator variable in the model controls the intensity or path of interactions among the two structures (Muhammed et al., 2020). This study unified a moderating effect of GTL in the relationship between GHRPs and EP. Hence, the result of $H8 (\beta = 0.428; t\text{-value} = 32.307; p = 0.000)$ signifies a significant relationship between GHRPs and EP by GTL. **Figure 2** further proves the iteration illustration of GTL between GHRPs and EP. So, the graph exemplifies that the firms' innovative green campaigns and initiatives and the supervision of environmental activities of GHRPs by the GTL lead to EP.

5. Discussion and conclusion

The current research proposed a model on the direct and indirect relationships in GHRPs, EMI, and GIPs toward improving EP, the mediation role of EMI between GHRPs and EP, the mediation role of GIP between GHRPs and EP, and finally, the moderation role of GTL between GHRPs and EP under the theoretical lens of the AMO theory. As the empirical results demonstrate, GHRPs directly and significantly influence EP. This result shows that in reshaping the green organizational tactics, companies also reshape human resource practices to manage the related issues to enhance firms' environmental performance (Makhloufi, Laghouag, et al., 2022; Wen et al., 2022). Furthermore, the study also discovers that GHRPs are directly and positively associated with EMI. Additionally, the outcomes exhibit that GHRPs directly influence GIP. This intriguing finding complements earlier research that concluded that companies' "green" objectives compel them to adopt various approaches in the form of green practices and green products, increasing their chances of growing and going green simultaneously (Lyon and Maxwell, 2020). Again, the empirical findings further demonstrated that EMI directly and significantly influences EP. EMI results in higher efficacy, fewer costs, and enhanced staff involvement, positively affecting EP (Anwar et al.,

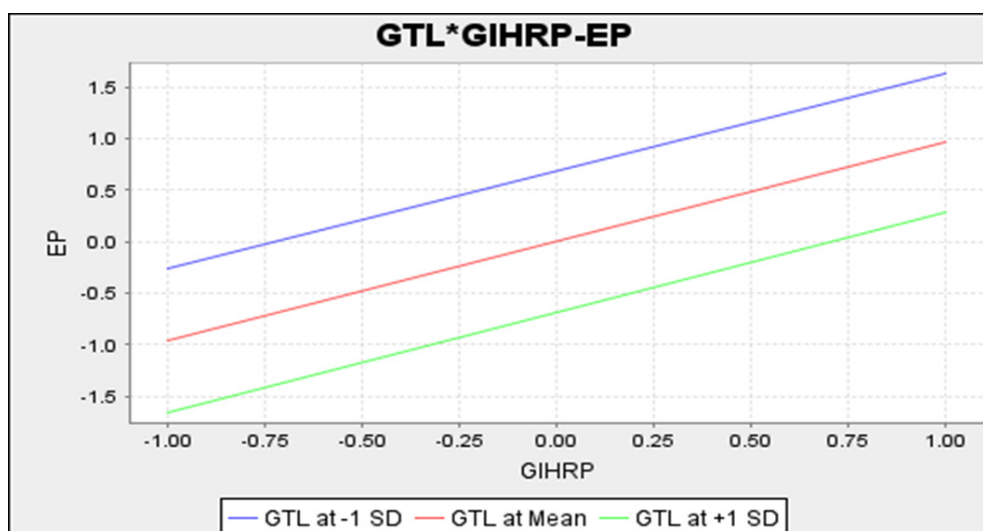


Figure 2. Moderation role of GTL on the relationship between GHRPs and EP.

2020; Banwo and Du, 2019; Zaid et al., 2018).

The study outcomes show that firms' GIP directly and positively influences their EP. The possible reason behind this result may be that numerous business organizations in South Africa have predominantly engaged in innovative environmental activities to respond to pressure from competitors, investors, and clients. Therefore, business organizations that implement corporate ecological policies tend to generate more solid environmental values that may activate employees' duties connected to their EP (Makhloufi, Laghouag, et al., 2022; Muisyo and Qin, 2021; Wang et al., 2021).

The outcomes showed that EMI mediates the interplay between GHRPs and EP for the mediation roles. In opposite to most previous studies, where only the direct relationship between EMI was examined, the present analysis included the potential mediation effect between GHRPs and EP. This outcome can be attributed that South African businesses' investments in GHRPs initiatives can elucidate stronger favorable feelings among workers, improving firms' EP in the long term. In addition, in collaboration with GHRPs, EMI motivates employees to engage in green initiatives and practices such as recycling papers and cans, green purchasing, training employees on environmental policies, and waste reduction to protect and improve the environment. The study result is in accordant with the earlier studies (Amjad et al., 2021; S. Das and Nayyar, 2020; Jamil and Johari, 2020).

Again, the empirical results specify that GIP mediates the relationship between GHRPs and EP. These empirical outcomes denote that a firm's GIP strategy and the exact proactive strategies concentrating on enhancing environmentally friendly technologies can improve their EP. Hence, GIP significantly relates to GHRPs and the company's overall EP. Finally, the study findings showed that the GTL positively moderates the interplay between GHRPs and EP. The intuition behind this finding is that GTL is directly involved in activities like green hiring, green training, and green product of a firm. Hence, GTL moderates and influences the actions of GHRPs towards protecting the environment. The study finding enormously contributes to the convergence between GTL, GHRPs, and EP research streams.

5.1. Theoretical implication

This study provides numerous theoretical contributions. Firstly, the present study enriches the extant literature on firms' green practice management by providing a theoretical lens from the green human resource management (GHRM) perspective. The importance of firms' GIP in their eco-friendly operations has been highly advocated by existing studies from both operations management and innovation perspective (Banwo and Du, 2019; Iqbal et al., 2021; Wang et al., 2021). The achievement of firms' GIP relies heavily on their employees' knowledge and hard work. Well, green trained and skilled employees will make firms' green innovation approaches more effective. However, investigating the impetus of GHRM on firms' green performance is relatively under investigation. As a result, by applying the AMO theory, this study proposes and analyzes the direct and indirect relationships in GHRPs, GTL, EMI, GIPs, and EP using data from South African firms. The outcome confirms that green innovative human resource applications like green inventive staffing and selection, advanced performance supervision, and advanced compensation might improve workers' ability, motivation, and opportunity to attain firms' green objectives (Amrutha and Geetha, 2020).

Secondly, the study provides insight into GHRPs and their association with EP within the framework of the AMO theory. EMI, such as a reward management policy whereby green pay and a reward system, is planned to entice, maintain, and encourage workers to contribute to the firms' environmental goals. However, the investigation of the drive of the mediation role of EMI between GHRPs toward firms' EP is comparatively under-studied. As a result, this contemporary study contributes to the existing body of knowledge by analyzing the indirect or mediation effect of EMI on the relationship between GHRPs and EP, which past studies have overlooked and thus extend the AMO theory. Also, the firm's GIP and proactive strategies concentrating on enhancing environmentally friendly technologies can improve EP. However, the study of the impetus of the mediation role of GIP between GHRPs toward firms' EP is relatively under investigation. As a result, by applying the AMO theory, this study proposes and analyzes the mediation role of GIP between GHRPs and EP using data from South African firms. The outcome confirms that employees become passionate about the environment when motivated to partake in GIPs and GHRPs programs and thus put in additional effort beyond their real work obligations and eventually contribute towards the EP of the firm. This outcome enriches the extant literature on firms' green practice management by providing a theoretical lens from the green human resource management and AMO theory perspective.

Third, the results of this study enrich the existing literature by suggesting that GTL can shape the connection between GHRPs and EP within the framework of the AMO theory. GTL looks at green innovation in goods and processes that target creation while reducing the harmful effects it might have on the environment. However, the investigation of the drive of the moderation role of GTL between GHRPs towards firms' EP is comparatively under-studied. This study proposes and analyzes the moderation role of GTL between GHRPs and EP within the theoretical framework of the AMO theory using data from South African firms. The result affirms that GTL is directly involved in activities like green hiring, green training, and green product of a firm. Hence, GTL advocates and influences the actions of GHRPs towards protecting the environment. These outcomes add to the extant literature on firms' green innovation management practices by providing a theoretical lens from the green human resource management and AMO theory perspective.

5.2. Managerial implications

This study also offers some managerial implications for practitioners manipulating GHRPs to facilitate a firm's EP. First, the positive influence of GHRPs on firms' EP suggests managers make good use of GHRPs to increase firm EP. For instance, in line with a firm's green goals, managers from the human resource department can implement green hiring, green training, and development to develop a creative HR strategy to make employees trust, support, and be willing to put efforts to target achieving the firm's green goals. Additionally, managers can utilize GHRPs to improve the firm's green innovation practices to increase workers' sense of belongingness and motivate them towards EP. This implies that when business managers improve emotional attachment and understanding of belongingness at the workplace will further enhance the moral obligation of workers in exhibiting EP. Managers can apply green human resource policies to make employees more committed to environmental sustainability, promoting EP in the long term. Managers from other departments within the firm can assist the HR department in implementing this strategy to improve the EP of the firm ultimately.

Second, the mediating role of EMI between GHRPs and EP suggests managers implement EMI such as environmental training activities and environmental communication practices for workers to boost their morale towards EP. EP should be tied with the business' strategic policies to enhance environmental performance. Also, the mediation role of GIP between GHRPs and EP suggests that when managers empower and motivate workers to get engaged in GIP (green product innovation, green process innovation, etc.) and GHRPs (green hiring, green training development, etc.), they will become much passionate on the environment and thus put in additional effort beyond their real work obligations and eventually contributing toward the EP of the firm.

Third, this research also has practical inferences from the moderation perspective. From the empirical results, the study revealed that GTL significantly and positively moderates the interplay between GHRPs and EP. The assumption is that business managers should not overlook the crucial role of GTL in enhancing the interplay between GHRPs and EP. Specifically, a firm should form more GTL in going green. Furthermore, managers should support GTL's goal to supervise and monitor GHRPs that target protecting the environment and improving EP. The implication is that GTL collaborates with GHRPs in adopting environmental policies and practices that enhance EP. Managers from other departments within the firm can assist the GTL department in implementing these policies to improve the EP of the firm ultimately.

5.3. Limitations

This paper also has limitations that need to be considered for future investigation: (1) the study's results are limited to the participating firms in South Africa, Johannesburg. Although firms' HRM practices towards environmental issues remain critical in South Africa, its distinct culture, government, and market dynamics differ from local and international enterprises. Future study into firms and enterprises in other places is required to assess the generalizability of the outcomes of this study. (2) Longitudinal research is required in the future to discover how environmental management initiatives and green transformational leadership can improve EP among workers at the workplace. (3) The data for this study's empirical analysis is cross-sectional. Future studies can also try to utilize secondary data to verify the results of this study. (4) This study only considers the moderation effect of one leadership type, GTL. Future research can explore different leadership styles' moderation impacts.

Author contributions

Conceptualization, JW; Data curation, AKS and SS; Formal analysis, JW and AKS; Investigation, JW and SS; Methodology, JW and ECO; Software, RB and AKS; Supervision, QY; Writing—original draft, JW and ECO; Writing—review and editing, QY and RB.

All authors have read and agreed to the published version of the manuscript.

Conflict of interest

The author declares no conflict of interest.

Data availability statement

Data used for the study will be provided upon request from the corresponding author.

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