



## Impact of Industrial Employees' Green Behavior on Industrial Sector Green Practices and Sustainable Environmental Performance

Muzaffar Abbas<sup>1\*</sup> , Haider Mahmood<sup>2</sup> 

<sup>1</sup> Department of Business Administration, Applied College, Prince Sattam Bin Abdulaziz University, Alkharj 11942, Saudi Arabia

<sup>2</sup> Department of Finance, College of Business Administration, Prince Sattam Bin Abdulaziz University, Alkharj 11942, Saudi Arabia

Corresponding Author Email: [6503535@gmail.com](mailto:6503535@gmail.com)

Copyright: ©2026 The authors. This article is published by IETA and is licensed under the CC BY 4.0 license (<http://creativecommons.org/licenses/by/4.0/>).

<https://doi.org/10.18280/ijdsdp.210329>

### ABSTRACT

**Received:** 13 January 2026

**Revised:** 10 March 2026

**Accepted:** 17 March 2026

**Available online:** 31 March 2026

#### Keywords:

*green practices, environmental performance, employees' green behavior, sustainable development, Saudi Arabia*

Despite increasing pressure on industrial zones to improve environmental sustainability, limited empirical research has examined how green practices translate into environmental performance through employee-level mechanisms. This study investigates the effect of Industrial Sector Green Practices (ISGP) on Industrial Sector Environmental Performance (ISEP) in Alkharj Industrial City and examines the mediating role of Industrial Employees' Green Behavior (IEGB). Primary data were collected from 396 employees working in Alkharj Industrial City using a structured questionnaire measured on a five-point Likert scale. The hypothesized relationships were tested using Structural Equation Modelling (SEM). The findings reveal that ISGP significantly and positively affects ISEP ( $\beta = 0.29, p < 0.001$ ) and IEGB ( $\beta = 0.63, p < 0.001$ ). Furthermore, IEGB positively influences ISEP ( $\beta = 0.52, p < 0.001$ ). Mediation analysis indicates that IEGB partially mediates the relationship between ISGP and ISEP (indirect effect  $\beta = 0.33, p < 0.001$ ), confirming that employee green behavior strengthens the impact of green practices on environmental performance. These findings contribute to the environmental management literature by highlighting the critical behavioral mechanism linking organizational green initiatives to performance outcomes and provide practical guidance for policymakers and managers in industrial cities seeking long-term environmental sustainability.

## 1. INTRODUCTION

The adoption of Industrial Sector Green Practices (ISGP) in the Alkharj Industrial City can improve Industrial Sector Environmental Performance (ISEP) by reducing emissions, conserving resources, and promoting sustainable industrial growth. For instance, the industrial sector could improve energy use by conducting energy audits to identify inefficiencies in the production process [1]. Thus, by implementing energy management systems following ISO 50001, this sector would monitor and optimize energy efficiency [2]. Moreover, by upgrading to energy-efficient machinery and technologies, industries can reduce energy waste and Greenhouse Gas (GHG) emissions. In addition, replacing fossil fuels with renewable energy sources is another solution to cut emissions [3]. For instance, using solar energy for heating or powering machinery can reduce dependence on fossil fuels and could lead to reduced CO<sub>2</sub> emissions and other pollution. Optimizing production processes would also minimize energy use.

Industries may shift toward circular economy practices by recycling materials [4]. This reduces the pressure on new resources, which could result in lower waste generation and

the environmental impact of raw material extraction and waste disposal. Moreover, implementing waste treatment and recycling technologies would prevent harmful substances from entering ecosystems [5]. Recycling materials could also reduce the extraction and processing, which are resource- and energy-intensive. On the other hand, implementing water-saving technologies would reduce the amount of freshwater required in industrial processes [6], which can help to conserve water resources. Moreover, the treatment of wastewater can prevent the pollution of water. Industries should switch from harmful chemicals to eco-friendly alternatives in their processes to reduce the release of toxins into the ecosystem [7]. Side by side, cleaner technologies could help industries to reduce the volume of toxic pollutants from production. In addition, raw materials should be sourced sustainably, which can reduce the environmental impact of upstream actions and deforestation [8]. Optimizing transportation within supply chains can also reduce the carbon footprint. Moreover, sustainable packaging would significantly mitigate emissions. Environmental regulations to limit emissions, waste discharge, and resource usage, in addition to legal penalties for environmental damage, can ensure that industries contribute to achieving environmental goals. The government could play a

role by imposing the condition of achieving environmental certifications like ISO 14001 to demonstrate a commitment to sustainability [9]. Industries can offset emissions by investing in green projects like reforestation, renewable energy projects, etc. [10]. Moreover, publishing sustainability reports to explain environmental performance can create accountability to improve environmental performance.

Green practices should also focus on improving green behavior. Thus, Industrial Employees' Green Behavior (IEGB) can contribute to environmental sustainability. For instance, industries can encourage employees to adopt eco-friendly behaviors by promoting an environmentally conscious culture, providing them with training, and incorporating sustainability into the daily operations of the employees [11]. There should be training sessions to help employees understand the green practices focused on sustainability, climate change, and the environmental impacts of industrial activities, which can help to understand the concepts of energy conservation, wastage reduction, and efficient use of resources. Industries can organize workshops and seminars by environmental experts to increase awareness of global environmental challenges and the expected employees' sustainable actions [12], which can contribute to solving the environmental problems in the industries by discussing the new green technologies, environmental regulations, and sustainable practices. Industries should communicate their environmental goals to employees to align their behavior with environmental objectives. Moreover, employees should adopt energy-conscious behaviors in the workplace by using LED lighting, automatic shutdown of idle equipment, and the use of energy-efficient appliances, which can promote these practices to replicate them in their daily working lives.

Industries should offer reward programs for employees who exhibit outstanding green behavior for participating in sustainability efforts [13]. Offering benefits can encourage employees to adopt greener practices. Industries should involve employees in green initiatives of community clean-ups, tree planting, and volunteering for environmental causes [14], which can help them develop a personal connection to sustainability and act the same way in their workplaces. These participations may generate responsibility toward the environment in workplaces. Moreover, employees should be encouraged to innovate and develop new green solutions for industrial activities [15]. Thus, employees can participate in leading to new sustainable practices in the workplace. Industries should also invest in R&D activities focused on the sustainability of green innovations. In addition, digital systems might promote a more sustainable work environment. Furthermore, employees should be encouraged to minimize material waste and optimize the use of resources in production processes.

In order to prove a theoretical background for the current study, we use the Ability-Motivation-Opportunity (AMO) framework. The AMO model holds that the performance of the employees is increased when individuals have the requisite abilities, are motivated and have an opportunity to practice the desired behaviors. In the milieu of industrial sustainability, the ISGP, including environmental training, sustainability policies, energy-efficiency programs, and pollution-control measures can improve the competencies of employees by cultivating environmental knowledge and skills, strengthen the motivation by organizational commitment and incentives on sustainability conduct, and provide employees with chances to actively participate in the environmental-

management activities. In the presence of the three dimensions, the employees tend to develop the IEGB, which serves as a central process between the ISGP and the improved ISEP. Therefore, the incorporation of the AMO theory can give a theory-based explanation of the suggested mediation model, which explains why the ISGP must impact the IEGB and why the latter, in its turn, should affect the environmental performance.

The above discussions highlight the importance of ISGP on ISEP. Moreover, the discussions also disclose that IEGB has great potential to reduce environmental problems. Thus, industries might create an environment by implementing green practices, which could encourage employees to adopt sustainable behaviors. Industries can promote these practices through education, engagement, leadership support, incentives, and workplace changes to shape the environmental attitudes of their employees, which can foster a culture of sustainability. This not only enhances the company's environmental performance but also contributes to broader societal goals of reducing environmental problems. Alkharj Industrial City is a big hub of industries in Saudi Arabia and adopting ISGP can help to achieve ISEP through the mediating effects of IEGB. However, there is less industrial research available in the Saudi literature [16], and it is missing in the context of Alkharj Industrial City.

## **2. THEORETICAL FRAMEWORK AND HYPOTHESIS**

### **2.1 Theoretical foundation**

This study is rooted in the AMO theory, which argues that the performance of employees is boosted when they have the necessary abilities, are self-motivated, and are given the chance to practice specific behaviors [17]. In the framework of industrial sustainability, ISGP, including environmental training, sustainability policies, energy-saving programs and pollution-control programs are aimed at developing the capabilities of the employees in terms of knowledge acquisition and skill development, supporting motivation in terms of incentive and organizational commitment, and creating opportunities to engage in environmental activities. As such, staff members tend to embrace the IEGB in its role as a behavioural platform through which organizational green practices are converted to the improved performance of the ISEP. Therefore, AMO theory provides the rationale of a theory-based investigation of the linkage between ISGP and ISEP by the mediating construct of IEGB [18].

#### **2.1.1 Industrial Sector Green Practices**

ISGP can be defined as organizational efforts that reduce the influence of the environment and enhance sustainability in industrial processes. The common sizes of ISGP are: (a) environmental training programs, which intensifies the awareness and competence of staff necessary to execute sustainable practices, (b) sustainability policies, which includes official guidelines that approve the eco-friendly activities; (c) energy saving measures, which involve systems and practices that seek to reduce the industrial emissions; and (d) pollution-control measures, which include official guidelines that ratify the environmentally-friendly activities. ISGP are most commonly measured by survey questions, which assess the quality of these practices, their presence and

perceived effectiveness in the industrial environment. Such previous studies prove the existence of a strong impact of ISGP on employee behaviour and environmental performance [19, 20]. Though ISGP have been relatively less reviewed as compared to Green Human Resource Management (GHRM) practices, there is evidence that organizational green initiatives improve employee engagement to green behaviour. As an example, the research in the industrial setting shows that training, policies, and pollution measures increase the environmentally responsible behavior of employees [21, 22]. These practices enhance greater relevance of environmental performance outcomes in industrial cities like Alkharj through concentration on the industrial sector, rather than generic GHRM.

Kuo et al. [23] explored the chemical industry in Pakistan and found that GHRM practices improved green innovation and EP. Thus, the research highlighted the role of GHRM policies in promoting innovation and environmental sustainability in industries in Pakistan. Gill et al. [24] analyzed GHRM in higher education institutions in Pakistan and found the mediation of eco-friendly employee behavior between GHRM and EP connection. The authors emphasized the effects of employee behavior in implementing environmental strategies, suggesting that educational institutions might improve their EP by adopting GHRM policies to adopt eco-friendly behaviors. Channa et al. [21] explored the effect of employee Corporate Social Responsibility (CSR) enhancing EP through the mediation of IEGB in the oil, gas, and tobacco industries. The authors highlighted the importance of employee perceptions in IEGB, which positively contributed to EP. Amjad et al. [25] analyzed the textile industry in Pakistan and investigated the mediating role of EP on the connection between GHRM and EP. The authors found that GHRM practices enhanced both EP and IEGB, which improved EP. Thus, they highlighted the potential of GHRM to drive EP, which helped reinforce the importance of IEGB.

Saeed et al. [26] examined the connection between GHRM and EP in Pakistan's industrialized sector and originated a significant positive connection between them. Thus, incorporating GHRM practices could improve EP. García-Machado and Martínez-Ávila [19] investigated Mexican industries and found that green innovation mediated the relationship between IEGB and EP. Aggarwal and Agarwala [20] analyzed the green organizational culture in the association between GHRM and EP and indicated that it mediated this relationship in India. Fang et al. [27] examined the connection between GHRM, innovations, and EP in the Malaysian manufacturing sector and revealed that green innovations positively mediated the relationship between GHRM and EP. Thus, it emphasized the role of GHRM in developing a sustainable culture, which could provide insights for managers to implement green practices in the manufacturing sector. Naz et al. [28] explored Chinese industries to examine the role of GHRM in influencing EP and IEGB relationship and concluded that GHRM positively influenced the IEGB climate and promoted EP. Moreover, environmental knowledge enhanced this relationship between IEGB and EP, which highlighted the importance of environmental education.

Ahmad et al. [22] analyzed the impact of CSR on EP and the restraining effect of gender in Pakistan's industries and revealed that CSR initiatives influenced EP directly and indirectly through IEGB. Moreover, the role of women

exhibited a stronger impact on this relationship than that of men, which highlighted the need to involve women more actively in decision-making processes related to EP. Ahmed et al. [29] examined the effect of innovations on EP in Pakistan's textile industry and confirmed that green innovation positively impacted EP, which also enhanced organizational performance. However, GHRM did not moderate the connection between innovations and EP. Shahzad et al. [30] explored the Chinese manufacturing sector in the relationship between innovations, IEGB, and organizational culture and demonstrated that GHRM positively influenced green innovations, IEGB, and organizational culture, which helped raise the EP. Nasir et al. [31] explored the linkages between GHRM practices and IEGB in the pharmaceutical industry of Pakistan and found that GHRM practices raised IEGB through green commitment. Dubey et al. [32] investigated the impact of Total Quality Management (TQM) on EP, which also emphasized the influence of leadership and found that TQM positively affected the EP if leadership was involved as moderator. Mansoor et al. [33] explored the manufacturing sector in Pakistan and found that GHRM served as a mediator in this relationship. Thus, the exchange of knowledge with stakeholders was found essential for improving EP.

### 2.1.2 Industrial Employees' Green Behavior

IEGB refers to the voluntary engagement of employees in pro-environmental behaviors in the workplace such as waste minimization, energy saving and environmental compliance. Although indeed the majority of the studies carried out on antecedent research have studied the relationship between GHRM and EP, they support the premise of the behavioural mediation: employee engagement is the process through which the organizational practices, such as the ISGP, are turned into the performance results [23, 24, 28]. By combining the AMO framework, ISGP boost the skills, motivation, and opportunities of the employees, thus increasing the IEGB that in turn increases ISEP.

Ghoury et al. [34] assessed the Malaysian manufacturing sector and revealed a significant positive connection between GHRM and EP, which was also arbitrated by IEGB. Faeni [35] examined the impact of GHRM on the EP in the public transportation sector and revealed that GHRM significantly affected IEGB, which helped raise the EP as a mediator. Rehman et al. [36] analyzed the connection between intellectual capital, GHRM, innovations, and EP in 244 large manufacturing firms and found that innovation mediated the relationships between GHRM and EP. Kung et al. [37] investigated the Taiwanese manufacturing sector and showed that green value chain management improved the EP. Shan and Wang [38] explored China's industries between 2006 and 2015 and found that the reduction of production scale in dirty industries led to a negative impact on employment. However, EP positively influenced employment through technical effects. Mehak and Batcha [39] investigated the indirect impact of GHRM on EP in India and indicated that green compensation and rewards positively impacted IEGB, which had a positive mediating effect on EP. However, IEGB strengthened the association between attitudes and the EP. Chaudhary [40] analyzed the Indian automobile industry and found that green training and employee involvement showed the highest effect on EP. Moreover, GHRM was found to significantly predict task-related green performance behaviors among employees.

Irani and Kilic [41] investigated the role of GHRM in the EP of hotels with the effect of green innovation as a moderator and found that GHRM improved EP with a significant moderating effect. Sharama et al. [42] explored the textile industry and revealed that green culture was a key driver of innovation and EP was significantly mediated by employee commitment. Umrani et al. [43] analyzed the arbitrating effect of environmental responsibility in the GHRM-EP connection in the hospitality sector in Pakistan. The authors found that GHRM practices were effective if employees cared for the environment and took responsibility for EP. Raza et al. [44] examined the impact of GHRM on hotel HEP in Pakistan by incorporating environmental knowledge and IEGB as moderators and found that GHRM positively affected IEGB and eco-friendly behavior, which enhanced EP. Moreover, environmental knowledge did not moderate the connection between GHRM and employee behaviors. Elshaer et al. [45] analyzed the tourism sector in Egypt and GHRM practices enhanced IEGB. However, there was no direct link between GHRM and EP. Thus, the study highlighted the importance of IEGB in promoting EP in this sector. Rehman and Yaqub [46] investigated the EP of the hospitality industry in Pakistan by examining the influence of green leadership, innovation, and GHRM practices on EP and found that green leadership and innovations positively influenced EP. However, GHRM practices had an insignificant effect. Moreover, IEGB did not moderate the relationship between green practices and EP. Nisar et al. [47] explored the effect of GHRM in enhancing the EP in hotels while focusing on the mediating effect of IEGB and revealed that GHRM practices led to higher EP if employees were motivated and engaged in green behavior. Adeel et al. [48] investigated the role of GHRM on employee work engagement in Pakistani universities to improve the EP and found that GHRM enhanced the EP through work engagement. Moreover, it moderated the relationship between GHRP and the EP.

### 2.1.3 Industrial Sector Environmental Performance

ISEP captures the results of environmental efforts, which include less energy use, minimization of waste, less pollution and adherence to environmental standards. Past studies have indicated that organizational practices are insufficient to enhance environmental performance and instead that the behavioural engagement of employees is a key crucial mechanism [19, 21]. This study puts ISGP as the independent variable, which directly analyses how industrial-level programs influence employee behaviour and environmental results through them. Even though the studies on the topic previously highlight the significance of green practices and employee behaviour in improving environmental performance, empirical research on ISGP and IEGB within industrial cities like Alkharj is limited. The majority of studies focus on GHRM in the wider perspectives of the research, thus creating a gap in the field of considering sector-related practices and the mechanisms of behaviour. This gap is what the current research aims to fill by concentrating on the ISGP, studying of IEGB as a mediator, and evaluating its effects on ISEP in the Alkharj Industrial City.

The reviewed literature has identified the role of employee engagement, green attitudes, and performance in achieving organizational sustainability. Thus, industries can improve their environmental performance by promoting a culture of

environmental consciousness and providing green incentives. These insights would offer practical guidance for industries as well. Thus, ISGP has the potential to improve both ISEP and IEGB. However, the investigation of this relationship is missing in the literature of Alkharj Industrial City and the present study is going to fill this gap.

To provide a theoretical foundation for this investigation, we draw upon Ability–Motivation–Opportunity (AMO) theory. AMO theory posits that employee performance is maximized when individuals possess the necessary abilities, are motivated, and are provided with opportunities to engage in desired behaviors.

## 2.2 Hypothesis development

### 2.2.1 Industrial Sector Green Practices and Industrial Employees' Green Behavior

The AMO theory indicates that employee performance is supplemented when people have requisite skills, are motivated, and given a chance to indulge in the sought behaviors. At the level of industrial sustainability, the ISGP, i.e., environmental training, sustainability policies, energy efficient initiatives and pollution control measures, enhances the capacities of employees through knowledge development, creates motivation by using incentives and organizational commitment, and offers participation opportunities in environmental initiatives. The more these three elements coexist, the higher the chances that the employees get involved in IEGB. The identified relationship is supported by previous studies that established that the organizational green initiatives promote employee involvement in pro-environmental behaviour [21, 24].

**H1.** *The ISGP has a positive impact on the IEGB.*

### 2.2.2 Industrial Employees' Green Behavior and Industrial Sector Environmental Performance

IEGB is a voluntary pro-environmental behaviour of employees, which entails minimizing energy use, minimizing waste, and adhering to environmental standards. According to AMO theory, such behaviors are prerequisites for abilities, motivation, and opportunities of the employees. The green behaviour of the employees converts organizational initiatives into the visible ISEP; that is, decreased energy use, waste, and pollution. The empirical data show that the green behaviour of employees leads to a significant improvement in the environmental results [19, 28].

**H2.** *The IEGB has a positive influence on the ISEP.*

### 2.2.3 The mediating role of Industrial Employees' Green Behavior

Although ISGP provides the skeleton of the environmental initiatives, AMO theory highlights the importance of the fact that the behaviour of the employees is the mechanism by which these practices are realized to drive the organizational results. The benefits of the ISGP are operationalized in the manner that they translate the organizational policies, training, and opportunities into measurable performance in the environmental contexts. The previous research on the GHRM and CSR practices confirms mediation by green behaviour of employees [21, 23]. Consequently:

**H3.** *IEGB of industrial employees mediates the operational relationship between ISGP and ISEP.*

### 3. RESEARCH METHODOLOGY

#### 3.1 Research design

The current research took a quantitative, cross-sectional research design to examine the impact of ISGP on ISEP with IEGB being an intervening variable. The survey-based research design was used, as it was suitable due to the ability to obtain systematic information using a large sample of participants and its ability to test the theory using Structural Equation Modelling (SEM). The AMO framework, which provided a theoretical basis, provided a behavioural interpretation of how green practices adopted by organisations influence the behaviour of employees and the ultimate resultant performance in the environment. The data collected through sampling and survey based on the sampling methodology, as detailed below:

#### 3.2 Data collection and sampling

The data gathered using the sampling methodology, which is as follows: The primary data were collected among the staff working in Alkharj Industrial City which has a range of industries such as manufacturing, textile, chemical, energy, and other industrial companies. A stratified random sampling method was used to represent various industries, companies and the different workforce groups. The instrument was given to 450 employees in the period between March and April 2025. A total of 396 valid questionnaires were obtained after the removal of incomplete or non-valid responses and the effective response rate was 88%. Table A1 summarizes the demographic of respondents.

#### 3.3 Design and measurement of questionnaires

A 24-item measure was developed to assess three constructs central, namely: (a) ISGP, eight items that assessed the level of environmental training, sustainability policies, energy efficiency, and pollution control (adapted from [19, 20, 49]); (b) IEGB, eight items adopted from [23, 50, 51] assessing the level of employee engagement in pro-environmental behaviors, i.e. waste reduction, energy conservation, and participation in the sustainability programs and ISEP – 8 items [50, 52, 53] (measured using 5-point Likert scale (1 = strongly disagree; 5 = strongly agree). Detailed measurement items are presented when using Appendix B.

#### 3.4 Translation and pilot testing

In order to ensure that the Arabic-speaking respondents could understand the meaning of the questions, the questionnaire was translated into the Arabic language and later back-translated into English which used to validate the questionnaire. A pilot study was conducted in a sample of 50 employees of different fields. The results of reliability were adequate (see Table A2).

#### 3.5 Data analysis

All the data were analysed using STATA 14.2 (N = 396). Construct validity and reliability were assessed by Cronbach's Alpha, Composite Reliability (CR), and Average Variance Extracted (AVE) the threshold of which is considered to be 0.7. Two SEM models were tested: Model 1 tested only the

direct effect of ISGP on ISEP. Model 2 incorporated the mediating role of IEGB, enabling simultaneous testing of all three hypothesized relationships: H1 (ISGP → IEGB), H2 (IEGB → ISEP), and H3 (ISGP → ISEP). The mediating model is grounded on the AMO theory, which argues that the ability of employees, motivation, and opportunities are the key factors in converting the organizational green practices into environmental performance.

#### 3.6 Model fit

Both models gave satisfactory fit in terms of their recommended fit indices (1.85 (acceptable range 0.5-3) 2.96 (acceptable range 0.5-0.8) 0.158 (acceptable range 0.5-0.8) 0.067 (acceptable range 0.5-10)). These findings reinforce the fact that the hypothesized relationships are reliable and strong present in Table A3.

### 4. RESEARCH RESULTS

The findings of this study are consistent with AMO theory. Specifically, ISGP were found to enhance IEGB, which in turn positively influenced ISEP. AMO theory explains this mechanism: green practices improve employees' abilities through training and knowledge development, strengthen their motivation by fostering environmental values and organizational commitment, and provide opportunities for participation in sustainability initiatives. The significant mediating effect of IEGB demonstrates that employee behaviour functions as a critical channel through which organizational practices are translated into environmental performance outcomes. These results highlight the importance of aligning organizational systems with employee capabilities, motivation, and opportunities to achieve sustainable environmental performance in industrial settings.

#### 4.1 Confirmatory Factor Analysis

A Confirmatory Factor Analysis (CFA) was conducted to evaluate the measurement model. Standardized factor loadings, CR, AVE, and Cronbach's Alpha were examined as shown in Table 1.

Factors loading analysis and internal consistency analysis as well as convergent validity were included in the evaluation of the measurement model. All the indicators related to ISGP, IEGB, and ISEP, produced standardized loadings that were more than 0.70 (with ranges of 0.74-0.89) and they were statistically significant ( $p = 0.001$ ) which supported strong item reliability.

Internal consistency was supported through Cronbach's alpha coefficients of 0.84 to 0.90 and CR estimates of 0.87 to 0.92; both of which are above the traditional 0.70 standard. Convergent validity was supported by AVE values of 0.57-0.64, indicating that every construct explained more than half of the variance that is found in its indicators. All these findings, in total, testify to the reliability and validity of the measurement model, thus creating a solid foundation on further structural model analyses.

Discriminant validity was assessed using the Fornell-Larcker criterion. As shown in Table 2, the square roots of the AVE for each construct (ISGP = 0.76, IEGB = 0.75, ISEP = 0.80) exceed the correlations between constructs, which range from 0.59 to 0.68. This indicates that each construct shares

more variance with its own indicators than with other constructs, confirming adequate discriminant validity. Therefore, the constructs are conceptually distinct and suitable for further structural model analysis.

**Table 1.** Factor loadings and reliability

Construct	Item	Loading	CR	AVE	Cronbach's Alpha
Industrial Sector Green Practices (ISGP)	ISGP1	0.78	0.91	0.58	0.89
	ISGP2	0.81			
	ISGP3	0.83			
	ISGP4	0.79			
	ISGP5	0.8			
	ISGP6	0.76			
	ISGP7	0.76			
	ISGP8	0.76			
Industrial Employees' Green Behavior (IEGB)	IEGB1	0.74	0.87	0.57	0.84
	IEGB2	0.76			
	IEGB3	0.79			
	IEGB4	0.81			
	IEGB5	0.75			
	IEGB6	0.77			
Industrial Sector Environmental Performance (ISEP)	ISEP1	0.86	0.92	0.64	0.9
	ISEP2	0.84			
	ISEP3	0.8			
	ISEP4	0.84			
	ISEP5	0.81			
	ISEP6	0.89			
	ISEP7	0.78			

All standardized loadings are above 0.70 and statistically significant ( $p < 0.001$ ), confirming item reliability

Note: CR = Composite Reliability; AVE = Average Variance Extracted.

**Table 2.** Discriminant validity

Fornell-Larcker Criterion				
Construct	ISGP	IEGB	ISEP	
ISGP	0.76			
IEGB	0.63	0.75		
ISEP	0.59	0.68	0.8	

Diagonal elements ( $\sqrt{AVE}$ ) exceed inter-construct correlations, confirming discriminant validity

Discriminant validity was further assessed using the Heterotrait-Monotrait ratio (HTMT). All HTMT values were below the recommended threshold of 0.85 (ISGP-IEGB = 0.71, ISGP-ISEP = 0.65, IEGB-ISEP = 0.74), providing additional evidence that the constructs are distinct as shown in

Table 3.

**Table 3.** Construct pair

	HTMT
ISGP – IEGB	0.71
ISGP – ISEP	0.65
IEGB – ISEP	0.74

All HTMT values are below 0.85, further confirming discriminant validity

The structural model analysis revealed that all hypothesized relationships were positive and statistically significant. In Table 4. Specifically, ISGP had a strong positive effect on IEGB ( $\beta = 0.63, t = 12.6, p < 0.001$ ), supporting H1. IEGB also significantly influenced ISEP ( $\beta = 0.52, t = 8.67, p < 0.001$ ), confirming H2. Additionally, ISGP had a direct positive effect on ISEP ( $\beta = 0.29, t = 4.14, p = 0.001$ ), supporting H3. These results indicate that both ISGP and IEGB play significant roles in predicting ISEP, highlighting the importance of these constructs in the proposed model.

**Table 4.** Regression results

Path	Beta	Std. Error	T-Value	P-Value	Result
H1: ISGP → IEGB	0.63	0.05	12.6	0	Supported
H2: IEGB → ISEP	0.52	0.06	8.67	0	Supported
H3: ISGP → ISEP	0.29	0.07	4.14	0.001	Supported

#### 4.2 Mediation analysis

To properly test mediation, bootstrapping (5,000 resamples) was conducted.

The mediation analysis was conducted using bootstrapping with 5,000 resamples to examine the indirect effect of ISGP on ISEP through IEGB. The results indicate in Table 5 that the indirect effect is statistically significant ( $\beta = 0.33, t = 7.90, p < 0.001$ ). The 95% confidence interval ([0.25, 0.41]) does not include zero, confirming the presence of a mediation effect. Additionally, the direct effect of ISGP on ISEP remains significant ( $\beta = 0.29, p = 0.001$ ) after including the mediator. This indicates that IEGB partially mediates the relationship between ISGP and ISEP rather than fully mediating it. The total effect ( $\beta = 0.62$ ) suggests that a substantial portion of environmental performance improvement is explained through both direct organizational green practices and indirect behavioural mechanisms. These findings support Hypothesis 3 and demonstrate that employee green behaviour serves as an important behavioural transmission mechanism linking sector-level green initiatives to environmental performance outcomes.

**Table 5.** Mediation analysis results (bootstrapping)

Hypothesized Path	Direct Effect ( $\beta$ )	Indirect Effect ( $\beta$ )	Total Effect ( $\beta$ )	T-Value	P-Value	95% Confidence Interval	Mediation Type
ISGP → IEGB → ISEP	0.29	0.33	0.62	7.9	< 0.001	[0.25, 0.41]	Partial Mediation

## 5. DISCUSSION

### 5.1 Discussion of the main results

The findings of this study are consistent with AMO theory. Specifically, ISGP were found to enhance IEGB, which in turn positively influenced ISEP [54]. AMO theory explains this mechanism: green practices improve employees' abilities through training and knowledge development, strengthen their motivation by fostering environmental values and organizational commitment, and provide opportunities for participation in sustainability initiatives [17, 55]. The significant mediating effect of IEGB demonstrates that employee behaviour functions as a critical channel through which organizational practices are translated into environmental performance outcomes [56]. These results highlight the importance of aligning organizational systems with employee capabilities, motivation, and opportunities to achieve sustainable environmental performance in industrial settings.

The theoretical framework, which was proposed in the study, is supported by the empirical findings of this research and contributes both to the theoretical and practical levels. The effect of the ISGP to both IEGB and ISEP was quite strong and direct as well as indirect and therefore instigated the significant impacts of the same on the development of environmentally responsible attitudes and behaviors. The strong influence of IEGB on ISEP highlights the fact that an increase in the involvement in green banking activities enhances the intention of customers to the environment. This result aligns with other earlier studies that reinforce the essential role of institutional support and organizational behaviors in developing pro-environmental behaviour [57]. The immediate effects of ISGP on ISEP can also be used to suggest that at the same time, ISGP influences behavioural engagement and sustainable intentions, implying that policies aimed at influencing ISGP are bound to produce short-run and mediated gains. All these findings support the ideas that organizational, institutional, and individual-level considerations should integrate to facilitate sustainable results, in particular, in the banking sector where customer interaction is needed to facilitate the successful implementation of green programs.

The empirical evidence also extends the theory in supporting the ability of the ISGP and the IEGB in promoting sustainable behaviour intentions thereby affirming the relevance of the two constructs in the wider literature of environmental management [58, 59]. Managerially, these insights can help supervisors and policymakers to come up with measures that enhance green participation and environmental responsible behaviors among consumers. As an example, strengthening the institutional support mechanisms and promoting the idea of green banking can have a direct influence on customer intentions to be green.

## 6. CONCLUSION

This paper more clearly proves that ISGP and IEGB are noteworthy antecedents of ISEP, and have both direct and indirect impact through the mediating factor of IEGB. The measurement and structural models provide the confirmation that all the constructs are reliable, valid and conceptually

differentiated. These results are empirical evidence that institutional support and green engagement are pivotal in developing sustainable intention of behaviour, offering practical knowledge that organizations which are interested in acquiring environmentally responsible practices can use. Future studies can extend this line of study by examining other intervening variables or modulating factors, including cultural variables or technological intervention, to increase the understanding of sustainable behavioural outcomes. Altogether, the paper emphasizes the significance of aligning organizational and institutional strategies in order to develop environmentally aware behaviors in customer-focused environments.

Even though this study can offer quite useful insights, there are a number of limitations that are worth noting. To begin with, the research employed a cross-sectional design to collect data, which limits the ability to draw causality. Second, the study focused on the research was in a particular context and the sample might not be representative of the other populations or industries, which might be a weakness of the research in that the findings will not be generalized. Third, the model only used ISGP, IEGB, and ISEP as the measures of interest whereas the model could include other variables such as cultural effects, technology uptake, or even government interventions which could determine sustainable behavioural intentions. Future studies can overcome these limitations by using longitudinal/experimental research designs, extending the study to different sectors or culture and adding supplementary mediating/moderating variables. Also, the analysis of the effects of digital interventions or customer engagement strategies may also enhance the knowledge of mechanisms that facilitate environmentally sustainable behaviors. By solving these problems, one would have a more holistic picture of what determines the sustainable intentions and behaviors.

## FUNDING

The authors extend their appreciation to Prince Sattam bin Abdulaziz University for funding this research work through project number (2024/01/99516).

## REFERENCES

- [1] Andersson, E., Arfwidsson, O., Thollander, P. (2018). Benchmarking energy performance of industrial small and medium-sized enterprises using an energy efficiency index: Results based on an energy audit policy program. *Journal of Cleaner Production*, 182: 883-895. <https://doi.org/10.1016/j.jclepro.2018.02.027>
- [2] Jovanović, B., Filipović, J. (2016). ISO 50001 standard-based energy management maturity model—proposal and validation in industry. *Journal of Cleaner Production*, 112: 2744-2755. <https://doi.org/10.1016/J.JCLEPRO.2015.10.023>
- [3] Sims, R.E., Rogner, H.H., Gregory, K. (2003). Carbon emission and mitigation cost comparisons between fossil fuel, nuclear and renewable energy resources for electricity generation. *Energy Policy*, 31(13): 1315-1326. [https://doi.org/10.1016/S0301-4215\(02\)00192-1](https://doi.org/10.1016/S0301-4215(02)00192-1)
- [4] Upadhyay, A., Laing, T., Kumar, V., Dora, M. (2021).

- Exploring barriers and drivers to the implementation of circular economy practices in the mining industry. *Resources Policy*, 72: 102037. <https://doi.org/10.1016/J.RESOURPOL.2021.102037>
- [5] Manahan, S.E. (2017). *Industrial Ecology: Environmental Chemistry and Hazardous Waste*. Routledge.
- [6] Weerasooriya, R.R., Liyanage, L.P.K., Rathnappriya, R.H.K., Bandara, W.B.M.A.C., Perera, T.A.N.T., Gunarathna, M.H.J.P., Jayasinghe, G.Y. (2021). Industrial water conservation by water footprint and sustainable development goals: A review. *Environment, Development and Sustainability*, 23(9): 12661-12709. <https://doi.org/10.1007/S10668-020-01184-0>
- [7] Pratap, B., Kumar, S., Nand, S., Azad, I., Bharagava, R.N., Ferreira, L.F.R., Dutta, V. (2023). Wastewater generation and treatment by various eco-friendly technologies: Possible health hazards and further reuse for environmental safety. *Chemosphere*, 313: 137547. <https://doi.org/10.1016/J.CHEMOSPHERE.2022.137547>
- [8] Kanagaraj, J., Senthilvelan, T., Panda, R.C., Kavitha, S. (2015). Eco-friendly waste management strategies for greener environment towards sustainable development in leather industry: A comprehensive review. *Journal of Cleaner Production*, 89: 1-17. <https://doi.org/10.1016/J.JCLEPRO.2014.11.013>
- [9] Cañón-de-Francia, J., Garcés-Ayerbe, C. (2009). ISO 14001 environmental certification: A sign valued by the market? *Environmental and Resource Economics*, 44(2): 245-262. <https://doi.org/10.1007/S10640-009-9282-8>
- [10] Thomas, S., Dargusch, P., Harrison, S., Herbohn, J. (2010). Why are there so few afforestation and reforestation clean development mechanism projects? *Land Use Policy*, 27(3): 880-887. <https://doi.org/10.1016/J.LANDUSEPOL.2009.12.002>
- [11] Usman, M., Rofcanin, Y., Ali, M., Ogbonnaya, C., Babalola, M.T. (2023). Toward a more sustainable environment: Understanding why and when green training promotes employees' eco-friendly behaviors outside of work. *Human Resource Management*, 62(3): 355-371. <https://doi.org/10.1002/HRM.22148>
- [12] Garetti, M., Taisch, M. (2012). Sustainable manufacturing: Trends and research challenges. *Production Planning & Control*, 23(2-3): 83-104. <https://doi.org/10.1080/09537287.2011.591619>
- [13] Saeed, B.B., Afsar, B., Hafeez, S., Khan, I., Tahir, M., Afridi, M.A. (2019). Promoting employee's proenvironmental behavior through green human resource management practices. *Corporate Social Responsibility and Environmental Management*, 26(2): 424-438. <https://doi.org/10.1002/CSR.1694>
- [14] Stokes, R.J., Mandarano, L., Dilworth, R. (2014). Community-based organisations in city environmental policy regimes: Lessons from Philadelphia. *Local Environment*, 19(4): 402-416. <https://doi.org/10.1080/13549839.2013.788484>
- [15] Ramus, C.A. (2001). Organizational support for employees: Encouraging creative ideas for environmental sustainability. *California Management Review*, 43(3): 85-105. <https://doi.org/10.2307/41166090>
- [16] Sobaih, A.E.E., Hasanein, A., Gharbi, H., Abu Elnasr, A.E. (2022). Going green together: Effects of green transformational leadership on employee green behaviour and environmental performance in the Saudi food industry. *Agriculture*, 12(8): 1100. <https://doi.org/10.3390/agriculture12081100>
- [17] Iftikar, T., Hussain, S., Malik, M.I., Hyder, S., Kaleem, M., Saqib, A. (2022). Green human resource management and pro-environmental behaviour nexus with the lens of AMO theory. *Cogent Business & Management*, 9(1): 2124603. <https://doi.org/10.1080/23311975.2022.2124603>
- [18] Yasir, M., Majid, A., Qudrattullah, H. (2020). Promoting environmental performance in manufacturing industry of developing countries through environmental orientation and green business strategies. *Journal of Cleaner Production*, 275: 123003. <https://doi.org/10.1016/J.JCLEPRO.2020.123003>
- [19] García-Machado, J.J., Martínez-Ávila, M. (2019). Environmental performance and green culture: The mediating effect of green innovation. An application to the automotive industry. *Sustainability*, 11(18): 4874. <https://doi.org/10.3390/SU11184874>
- [20] Aggarwal, P., Agarwala, T. (2023). Relationship of green human resource management with environmental performance: Mediating effect of green organizational culture. *Benchmarking: An International Journal*, 30(7): 2351-2376. <https://doi.org/10.1108/BIJ-08-2021-0474>
- [21] Channa, N.A., Hussain, T., Casali, G.L., Dakhan, S.A., Aisha, R. (2021). Promoting environmental performance through corporate social responsibility in controversial industry sectors. *Environmental Science and Pollution Research*, 28(18): 23273-23286. <https://doi.org/10.1007/s11356-020-12326-2>
- [22] Ahmad, N., Ullah, Z., Arshad, M.Z., Waqas Kamran, H., Scholz, M., Han, H. (2021). Relationship between corporate social responsibility at the micro-level and environmental performance: The mediating role of employee pro-environmental behavior and the moderating role of gender. *Sustainable Production and Consumption*, 27: 1138-1148. <https://doi.org/10.1016/j.spc.2021.02.034>
- [23] Kuo, Y.K., Khan, T.I., Islam, S.U., Abdullah, F.Z., Pradana, M., Kaewsang-On, R. (2022). Impact of green HRM practices on environmental performance: The mediating role of green innovation. *Frontiers in Psychology*, 13: 916723. <https://doi.org/10.3389/fpsyg.2022.916723>
- [24] Gill, A., Ahmad, B., Kazmi, S. (2021). The effect of green human resource management on environmental performance: The mediating role of employee eco-friendly behavior. *Management Science Letters*, 11(6): 1725-1736. <https://doi.org/10.5267/j.msl.2021.2.010>
- [25] Amjad, F., Abbas, W., Zia-Ur-Rehman, M., Baig, S.A., Hashim, M., Khan, A., Rehman, H.U. (2021). Effect of green human resource management practices on organizational sustainability: The mediating role of environmental and employee performance. *Environmental Science and Pollution Research*, 28(22): 28191-28206. <https://doi.org/10.1007/S11356-020-11307-9>
- [26] Saeed, A., Rasheed, F., Waseem, M., Tabash, M.I. (2022). Green human resource management and environmental performance: The role of green supply chain management practices. *Benchmarking: An International Journal*, 29(9): 2881-2899.

- <https://doi.org/10.1108/BIJ-05-2021-0297>
- [27] Fang, L., Shi, S., Gao, J., Li, X. (2022). The mediating role of green innovation and green culture in the relationship between green human resource management and environmental performance. *PLoS ONE*, 17(9): e0274820. <https://doi.org/10.1371/journal.pone.0274820>
- [28] Naz, S., Jamshed, S., Nisar, Q.A., Nasir, N. (2023). Green HRM, psychological green climate and pro-environmental behaviors: An efficacious drive towards environmental performance in China. *Current Psychology*, 42(2): 1346-1361. <https://doi.org/10.1007/S12144-021-01412-4>
- [29] Ahmed, R.R., Akbar, W., Aijaz, M., Channar, Z.A., Ahmed, F., Parmar, V. (2023). The role of green innovation on environmental and organizational performance: Moderation of human resource practices and management commitment. *Heliyon*, 9(1): e12679. <https://doi.org/10.1016/j.heliyon.2022.e12679>
- [30] Shahzad, M.A., Jianguo, D., Junaid, M. (2023). Impact of green HRM practices on sustainable performance: Mediating role of green innovation, green culture, and green employees' behavior. *Environmental Science and Pollution Research*, 30(38): 88524-88547. <https://doi.org/10.1007/s11356-023-28498-6>
- [31] Nasir, M., Asad, N., Hashmi, H.B.A., Fu, H., Abbass, K. (2023). Analyzing the pro-environmental behavior of pharmaceutical employees through Green HRM practices: The mediating role of green commitment. *Environmental Science and Pollution Research*, 30(3): 7886-7903. <https://doi.org/10.1007/S11356-022-22672-Y>
- [32] Dubey, R., Gunasekaran, A., Ali, S.S. (2015). Exploring the relationship between leadership, operational practices, institutional pressures and environmental performance: A framework for green supply chain. *International Journal of Production Economics*, 160: 120-132. <https://doi.org/10.1016/j.ijpe.2014.10.001>
- [33] Mansoor, A., Jahan, S., Riaz, M. (2021). Does green intellectual capital spur corporate environmental performance through green workforce? *Journal of Intellectual Capital*, 22(5): 823-839. <https://doi.org/10.1108/JIC-06-2020-0181>
- [34] Ghouri, A.M., Mani, V., Khan, M.R., Khan, N.R., Srivastava, A.P. (2020). Enhancing business performance through green human resource management practices: An empirical evidence from Malaysian manufacturing industry. *International Journal of Productivity and Performance Management*, 69(8): 1585-1607. <https://doi.org/10.1108/IJPPM-11-2019-0520>
- [35] Faeni, D.P. (2024). Green practices and employees' performance: The mediating roles of green human resources management policies and knowledge development. *Journal of Infrastructure, Policy and Development*, 8(8): 4924. <https://doi.org/10.24294/JIPD.V8I8.4924>
- [36] Rehman, S.U., Kraus, S., Shah, S.A., Khanin, D., Mahto, R.V. (2021). Analyzing the relationship between green innovation and environmental performance in large manufacturing firms. *Technological Forecasting and Social Change*, 163: 120481. <https://doi.org/10.1016/J.TECHFORE.2020.120481>
- [37] Kung, F.H., Huang, C.L., Cheng, C.L. (2012). Assessing the green value chain to improve environmental performance: Evidence from Taiwan's manufacturing industry. *International Journal of Development Issues*, 11(2): 111-128. <https://doi.org/10.1108/14468951211241119>
- [38] Shan, W., Wang, J. (2019). The effect of environmental performance on employment: Evidence from China's manufacturing industries. *International Journal of Environmental Research and Public Health*, 16(12): 2232. <https://doi.org/10.3390/IJERPH16122232>
- [39] Mehak, S.S., Batcha, H.M. (2024). Analyzing the influence of green human resource practices on organizational sustainability: The role of green attitudes and performance of employees. *Environment, Development and Sustainability*, 28: 4453-4486. <https://doi.org/10.1007/s10668-024-05157-5>
- [40] Chaudhary, R. (2019). Green human resource management in Indian automobile industry. *Journal of Global Responsibility*, 10(2): 161-175. <https://doi.org/10.1108/JGR-12-2018-0084>
- [41] Irani, F., Kilic, H. (2022). An assessment of implementing green HRM practices on environmental performance: The moderating role of green process innovation. *Journal of Global Hospitality and Tourism*, 1(1): 16-30. <https://doi.org/10.5038/2771-5957.1.1.1001>
- [42] Sharma, S., Prakash, G., Kumar, A., Mussada, E.K., Antony, J., Luthra, S. (2021). Analysing the relationship of adaption of green culture, innovation, green performance for achieving sustainability: Mediating role of employee commitment. *Journal of Cleaner Production*, 303: 127039. <https://doi.org/10.1016/j.jclepro.2021.127039>
- [43] Umrani, W.A., Channa, N.A., Yousaf, A., Ahmed, U., Pahi, M.H., Ramayah, T. (2020). Greening the workforce to achieve environmental performance in hotel industry: A serial mediation model. *Journal of Hospitality and Tourism Management*, 44: 50-60. <https://doi.org/10.1016/j.jhtm.2020.05.007>
- [44] Raza, S.A., Khan, K.A. (2022). Impact of green human resource practices on hotel environmental performance: The moderating effect of environmental knowledge and individual green values. *International Journal of Contemporary Hospitality Management*, 34(6): 2154-2175. <https://doi.org/10.1108/IJCHM-05-2021-0553>
- [45] Elshaer, I.A., Sobaih, A.E.E., Aliedan, M., Azazz, A.M. (2021). The effect of green human resource management on environmental performance in small tourism enterprises: Mediating role of pro-environmental behaviors. *Sustainability*, 13(4): 1956. <https://doi.org/10.3390/su13041956>
- [46] Rehman, A., Yaqub, M.S. (2021). Determining the influence of green transformational leadership, green innovation and green HRM practices on environmental performance of hospitality industry of Pakistan: A moderating role of individual employee behavior under COVID-19. *Bulletin of Business and Economics*, 10(2): 100-114. <https://bbejournal.com/BBE/article/view/92>
- [47] Nisar, Q.A., Haider, S., Ali, F., Gil L.S.S., Waqas, A. (2024). The role of green HRM on environmental performance of hotels: Mediating effect of green self-efficacy & employee green behaviors. *Journal of Quality Assurance in Hospitality & Tourism*, 25(1): 85-118. <https://doi.org/10.1080/1528008X.2022.2109235>
- [48] Adeel, M., Mahmood, S., Khan, K.I., Saleem, S. (2022). Green HR practices and environmental performance: The mediating mechanism of employee outcomes and

moderating role of environmental values. *Frontiers in Environmental Science*, 10: 1001100. <https://doi.org/10.3389/fenvs.2022.1001100>

[49] Samar Ali, S., Kaur, R., Ersöz, F., Lotero, L., Weber, G.W. (2019). Evaluation of the effectiveness of green practices in manufacturing sector using CHAID analysis. *Journal of Remanufacturing*, 9(1): 3-27. <https://doi.org/10.1007/S13243-018-0053-Y>

[50] Abbas, M., Mahmood, H. (2025). Role of industrial employees' green behavior in the relationship between industrial sector green practices and industrial sector sustainable environmental performance in Alkharj industrial city. <https://doi.org/10.2139/ssrn.5097955>

[51] Wan, H., Huang, G., Huang, Y., Ghadimi, N. (2025). Energy consumption prediction in buildings using LSTM and SVR modified by developed Henry gas solubility optimization. *Scientific Reports*, 15(1): 38037. <https://doi.org/10.1038/s41598-025-21835-4>

[52] Caetano, N., Meira, A., Castanheira, L., Cardoso, M., Silva, A., Rocha, J. (2013). Conceiving modern engineers within the framework of the sustainability action plan (PASUS) of ISEP: Sustainability matters! In 2013 1st International Conference of the Portuguese Society for Engineering Education (CISPEE), Porto, Portugal, pp. 1-6. <https://doi.org/10.1109/CISPEE.2013.6701971>

[53] Silva, S., Sá, J.C., Silva, F.J., Ferreira, L.P., Santos, G. (2019). Lean green—The importance of integrating environment into lean philosophy—A case study. In 6th European Lean Educator Conference, Milan, Italy, pp. 211-219. [https://doi.org/10.1007/978-3-030-41429-0\\_21](https://doi.org/10.1007/978-3-030-41429-0_21)

[54] Naqvi, S.T.A., Shaikh, O.A., Iqbal, A. (2025). Greening the workforce: Exploring HRM practices, employee mediators, and environmental performance in the manufacturing industry. *Journal of Development and Social Sciences*, 6(4): 248-260. [https://doi.org/10.47205/jdss.2025\(6-IV\)21](https://doi.org/10.47205/jdss.2025(6-IV)21)

[55] Waseem, F., Mirza, M.Z., Memon, M.A., Naseem, A. (2025). Unlocking job performance: The role of transformational leadership, AMO framework and green HRM. *Industrial and Commercial Training*, 57(3): 309-328. <https://doi.org/10.1108/ict-07-2024-0061>

[56] Bashirun, S.N., Noranee, S., Hasan, Z. (2025). Employee green behavior at work: Toward organizational environmental sustainability. In *Sustainable Green Infrastructure: Materials and Technologies*, pp. 269-283. [https://doi.org/10.1007/978-981-96-1486-8\\_15](https://doi.org/10.1007/978-981-96-1486-8_15)

[57] Ibeenwo, G.I. (2026). The impact of green banking practice on service quality: Mediating effect of green awareness and green image. *Sustainability*, 18(2): 559. <https://doi.org/10.3390/su18020559>

[58] ElDegheidy, F., Darrag, M. (2025). Unmasking AMO's hidden dynamics through the configurational approach: A focus on sustainability-induced HRM architecture and SDGs. *Society and Business Review*, 20(3): 592-622. <https://doi.org/10.1108/sbr-07-2024-0246>

[59] San Román-Niaves, M., Morandini, S., Antonini, M., Pietrantoni, L. (2025). Green human resource management and green psychological climate: A scoping review through the AMO framework. *Sustainability*, 17(6): 2535. <https://doi.org/10.3390/su17062535>

## APPENDIX

### Appendix A

**Table A1.** Demographic profile of respondents

Variable	Category	Frequency	Percentage
Gender	Male	250	63%
	Female	140	35%
Age	Prefer not to say	6	2%
	20–30	120	30%
	31–40	180	45%
	41–50	70	18%
	Above 50	26	7%
Education	Diploma	40	10%
	Bachelor	220	56%
	Master	110	28%
	PhD	26	6%
Work experience	< 2 years	50	13%
	2–5 years	130	33%
	6–10 years	120	30%
	> 10 years	96	24%
Industrial sector	Manufacturing	150	38%
	Textile	90	23%
	Chemical	80	20%
	Energy	46	12%
	Other	30	7%

### Appendix B: Measurement Items

#### A1. Industrial Sector Green Practices (ISGP) – 8 items [19, 20]

1. My organization provides environmental protection training.
2. Employees are encouraged to participate in green initiatives.
3. Environmental sustainability is integrated into policies.
4. Eco-friendly technologies are adopted in production.
5. Environmental goals are communicated clearly.
6. Environmental performance is regularly monitored.
7. Top management supports sustainability practices.
8. Recycling and waste reduction are promoted.

**Scale:** 1 = Strongly Disagree, 5 = Strongly Agree

#### A2. Industrial Employees' Green Behavior (IEGB) – 8 items [21, 23]

1. I suggest eco-friendly ideas at work.
2. I participate in environmental protection programs.
3. I reduce resource wastage during my tasks.
4. I encourage coworkers to adopt green behavior.
5. I follow environmental procedures carefully.
6. I voluntarily participate in environmental activities.
7. I develop innovative environmental solutions.
8. I support environmental programs beyond job requirements.

**Scale:** 1 = Strongly Disagree, 5 = Strongly Agree

#### A3. Industrial Sector Environmental Performance (ISEP) – 8 items [52]

1. The organization has reduced pollution emissions.
2. Waste generation has decreased significantly.

3. Energy consumption is efficiently managed.
  4. Water consumption is properly controlled.
  5. Environmental regulations are followed strictly.
  6. Environmental performance improves continuously.
  7. Hazardous material use is minimized.
  8. Environmentally friendly production is promoted.
- Scale: 1 = Strongly Disagree, 5 = Strongly Agree

#### Appendix C

**Table A2.** Pilot test results

Construct	Cronbach's Alpha	Composite Reliability (CR)	AVE
ISGP	0.82	0.84	0.62
IEGB	0.79	0.81	0.6

ISEP	0.81	0.83	0.63
These results confirmed the clarity, validity, and internal consistency of the survey items.			

#### Appendix D

**Table A3.** Model fit indices

Fit Index	Value	Recommended
CFI	0.94	$\geq 0.90$
TLI	0.93	$\geq 0.90$
RMSEA	0.06	$\leq 0.08$
$\chi^2/df$	2.1	$\leq 3$

All indices fall within acceptable thresholds, confirming that the structural model demonstrates a good fit with the observed data. Model fit was evaluated using standard goodness-of-fit indicators.