

# Digital Green HRM and its Effect on Employee Engagement in the Era of Sustainable Workplace

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## Abstract

This study investigates the impact of Digital Green Human Resource Management (Digital Green HRM) on employee engagement in sustainable workplaces. Digital Green HRM integrates digital HR technologies, such as paperless systems, virtual training, digital recruitment and cloud-based HR processes, with environmentally sustainable HR practices. Data were collected from 400 employees working in organizations that had adopted digital HR systems and sustainability initiatives. Reliability analysis demonstrated strong internal consistency among constructs, with Cronbach's alpha values ranging from 0.85 to 0.90. Confirmatory Factor Analysis established convergent validity, as factor loadings [0.66–0.88], composite reliability values (0.86 and above) and Average Variance Extracted scores (0.55 and above) exceeded recommended thresholds. Structural Equation Modeling indicated a satisfactory model fit. The findings reveal that Digital Green HRM significantly influences sustainability awareness ( $\beta = 0.62, p < 0.001$ ) and green commitment ( $\beta = 0.54, p < 0.001$ ). Further, sustainability awareness ( $\beta = 0.41, p < 0.001$ ) and green commitment ( $\beta = 0.46, p < 0.001$ ) positively affect employee engagement. Digital Green HRM also exerts a direct positive effect on employee engagement ( $\beta = 0.29, p = 0.003$ ). Mediation analysis confirmed significant indirect effects through sustainability awareness and green commitment. The study concludes that Digital Green HRM enhances employee engagement both directly and indirectly by fostering environmental awareness and commitment, highlighting its importance in digitally enabled sustainable workplaces.

**Keywords:** Digital Green HRM, Green Commitment, SEM, Sustainability Awareness.

## Introduction

Sustainability has become a major concern for organizations due to increasing environmental challenges such as climate change, pollution and depletion of natural resources (1). Modern organizations are expected to adopt environmentally responsible practices that contribute to sustainable development while maintaining economic performance (2, 3). Consequently, sustainability has become an important strategic component across organizational functions, including Human Resource Management (4, 5).

The Human Resource Management may contribute significantly to environmental awareness and encouragement to the employees to engage in the earth-friendly practices (6). Green HRM becomes one of such approaches as well, in which the environmental management is merged with the HR policies and practices (7). Digital technologies are

rapidly changing traditional HR practices in organisations. HR practices are now more efficient and eco-friendlier thanks to digital platforms, cloud-based systems and electronic documents. Digital Green HRM combines digital technologies with eco-friendly HR practices (8).

Digital Green HRM involves the use of digital tools and technologies to implement environmentally sustainable HR practices, including digital recruitment, online training, virtual performance management and electronic documentation (9). Previous studies have highlighted that environmentally focused HR practices are essential for building sustainable organizations and encouraging employee participation in sustainability initiatives (10, 11).

Employee engagement is another important factor influencing organizational performance and long-

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term success (12). It refers to the emotional, cognitive and behavioral involvement of employees in their work roles. Engaged employees are generally more enthusiastic, motivated and committed to organizational objectives (13).

The concept of employee engagement was introduced as the psychological presence of employees in their work roles, where individuals express themselves physically, cognitively and emotionally through job performance. Studies have also shown that the positive effects of Green HRM practices include worker commitment, job satisfaction and involvement (14). In sustainable workplaces, employee engagement becomes even more significant because engaged employees are more likely to support environmental initiatives and participate in sustainability-related activities (15).

Digital HR systems enable organizations to communicate sustainability goals effectively, provide online environmental training and involve employees in green initiatives (16).

Research also indicates that green HR practices strengthen environmental commitment and encourage pro-environmental behavior among employees (17). When combined with digital technologies, these practices become more interactive, accessible and effective in enhancing employee involvement in sustainability initiatives.

### **Research Gap**

While previous studies have examined the relationship between Green HRM practices and employee outcomes, limited research has explored how digital technologies enhance the implementation of green HR practices (18, 19). In addition, limited empirical evidence exists regarding the mediating role of sustainability awareness and green commitment in the relationship between Digital Green HRM and employee engagement (20).

Most existing studies have focused separately on traditional Green HRM or electronic HRM, while their integration as Digital Green HRM remains underexplored. Furthermore, the psychological mechanisms through which Digital Green HRM influences employee engagement have received little attention. Therefore, this study aims to develop and empirically test an integrated model combining digital HR systems and sustainable HRM practices to contribute to the literature on sustainable HRM and employee engagement.

### **Theoretical Framework**

This study is grounded in Social Exchange Theory (SET) and Ability-Motivation-Opportunity (AMO) Theory. Social Exchange Theory suggests that employees tend to reciprocate organizational support with positive attitudes and behaviours. When organizations adopt Digital Green HRM practices, employees perceive organizational commitment toward sustainability and employee development, which enhances their engagement and commitment. AMO Theory further explains that HRM practices improve employee performance by enhancing employees' abilities, motivation and opportunities to contribute. Digital Green HRM increases employees' environmental knowledge, strengthens green commitment and provides digital platforms for sustainable participation, thereby improving employee engagement.

### **Review of Existing Literature**

Green HRM is an important component of sustainable Human Resource Management that integrates environmental policies into HR practices such as green recruitment, training, performance management and reward systems to improve environmental performance and employee engagement (2, 10). Environmental practices including employee empowerment, environmental training and participative practices help create environmental awareness and encourage pro-environmental behaviour among employees, contributing to long-term sustainability (14, 21).

The emergence of e-HRM has further improved HR processes through digital technologies, making recruitment, training and performance appraisal more efficient and transparent while reducing administrative costs (22).

Employees' engagement has been defined as a psychological state of meaningfulness, safety and availability that affects their enthusiasm and job performance (23, 24). Employee engagement has also been defined as a positive and fulfilling work-related state of being that is defined by vigor, dedication and absorption (25-27).

Studies have indicated that environmental consciousness plays an important role in workplace sustainability and helps employees to be actively involved in the sustainability efforts of their organization (26-28). For this reason, it is necessary to raise the awareness of the employees

in relation to the environmental objectives, encouraging responsible behaviour.

Green commitment has been found to augment the emotional connection between employees and sustainability target and organizational values, which further enhance their engagement and organizational citizenship behaviours. These findings highlight the importance of environmental commitment in achieving sustainable workplace outcomes (28, 29).

Based on the identified research gaps, the present study aims to address the following research objectives:

- (a) To examine the impact of Digital Green HRM on sustainability awareness and green commitment among employees,
- (b) To analyze the effect of sustainability awareness and green commitment on employee engagement,
- (c) To investigate the direct effect of Digital Green HRM on employee engagement,
- (d) To examine the mediating roles of sustainability awareness and green commitment in the relationship between Digital Green HRM and employee engagement.

## Methodology

### Research Design

This study employed a quantitative explanatory research design to investigate whether Digital Green Human Resource Management (Digital GHRM) influences employee engagement in sustainable workplaces. The research design that would suit this study is quantitative research design because it enables the researcher to test the proposed hypotheses of the research through statistical analysis of relationships between the variables.

Digital Green HRM is the combination of digital technologies and sustainable HR practices in regard to ensuring organizational sustainability. The analysis explores the relationship between Digital GHRM practices and employee engagement with two mediating variables of sustainability awareness and green commitment.

To test the connections between these variables, the research utilizes the Structural Equation Modelling (SEM) that enables the analysis of many relationships between the latent constructs simultaneously and gives the most accurate assessment of the offered research model.

## Population and Sampling

### Target Population

The study target population was employed in organizations with sustainability programs and digital HRs. Such employees are supposed to be exposed to the digital HR practices, as well as sustainability-related organizational policies.

### Sampling Technique

The research takes a stratified random sampling method to allow the sample to represent various forms of organizations. The selection of employees involved employees in different sectors such as:

- (a) Information Technology organizations,
- (b) Manufacturing companies,
- (c) Service sector firms.

This sampling method enhanced representativeness and generalizability of the research results in the various organizational settings.

### Sample Size

In the case of Structural Equation Modelling (SEM), the sample size of 350 to 500 respondents is recommended as a sufficient number to get trustworthy statistical estimates and model stability.

### Data Collection

The research is based on primary data gathered in the form of a questionnaire survey that was distributed to employees who have to work in chosen organizations.

The data was gathered using a structured online questionnaire sent by emails and the professional networking platforms to employees from the organizations which are implementing digital HR systems and sustainability initiatives. Five hundred questionnaires were sent out and 400 valid returns were received giving a response rate of 80%. Respondents were given informed consent that explained the academic goals of the study, the study's voluntary nature, the anonymity of the study and assurances of the confidentiality of the study. There was no collection of personally identifiable information and responses were used only for research purposes.

### Measurement Scale

Every variable in the study is measured in a five-point Likert scale where the respondents were asked to respond to the statements depending on the degree of their agreement.

**Scale range:** Strongly Disagree – 1; Disagree – 2; Neutral – 3; Agree – 4; Strongly Agree – 5

**Table 1:** Measurement Constructs and Their Description

Construct	Description
Digital Green HRM	Use of digital technologies to implement environmentally sustainable HR practices
Sustainability Awareness	Employees' awareness of organizational sustainability initiatives
Green Commitment	Employees' psychological commitment toward environmental goals
Employee Engagement	Level of employee involvement, enthusiasm and participation in work

### Measurement Constructs

The questionnaire includes measurement items for the following constructs in Table 1. In Table 1, the constructs used in the study included Digital Green HRM, Sustainability Awareness, Green Commitment and Employee Engagement. Digital Green HRM focused on the use of digital technologies to support sustainable HR practices. Sustainability Awareness represented employees understanding of organizational sustainability initiatives, while Green Commitment and Employee Engagement reflected employee's psychological attachment and active involvement towards organizational environmental goals.

To guarantee reliability and validity, measurement items were based on the scales that have been proven to be valid in the past in areas of human resource management and sustainability research. The indicators achieved by digitalizing HRM were paperless HR systems, digital recruitment platforms, virtual sustainability training and cloud-based HR communication. Sustainability Awareness reflected the level of knowledge about sustainability goals and initiatives among employees. The psychological commitment to organizational environmental values was measured by the Green Commitment of employees. Vigor, dedication and active participation dimensions of Employee Engagement were based on validated scales.

### Data Analysis Tools

The statistical software was used to analyze the obtained data and test the hypothesized relationships between the variables.

Data were analyzed using IBM SPSS Statistics for Windows 11, Version 27.0 (IBM Corp., Armonk, NY, USA) for preliminary data analysis, while IBM SPSS AMOS for Windows 11, Version 27.0 (IBM Corp., Armonk, NY, USA) was used for Confirmatory Factor Analysis (CFA) and Structural Equation Modelling (SEM). These instruments make it possible to do rigorous statistical testing of the measurement model and the structural relationships between the constructs in the research model.

### Data Analysis Procedure

#### Preliminary Data Screening

Prior to the advance statistical analysis, SPSS analysis was used to investigate the dataset to verify the quality of data. The next steps was carried out: Missing value analysis, Outlier detection, Normality testing using skewness and kurtosis, Descriptive statistics such as mean and standard deviation. These steps help ensure the reliability and suitability of the data for structural modelling.

#### Reliability Analysis

Cronbach's Alpha was used to determine the reliability of the measurement constructs in the determination of internal consistency.

The acceptable reliability threshold is:

#### Cronbach's Alpha $\geq 0.70$

A value which exceeds this message is a signal that the items used in measurements are always reflecting the desired constructs.

#### Confirmatory Factor Analysis (CFA)

Confirmatory Factor Analysis was conducted using AMOS to validate the measurement model and examine the relationship between observed variables and latent constructs. The following criteria was used to assess convergent validity: (a) Standardized factor loadings  $\geq 0.60$ , (b) Composite Reliability (CR)  $\geq 0.70$ , (c) Average Variance Extracted (AVE)  $\geq 0.50$ . Discriminant validity was established when the square root of AVE for each construct is greater than the correlations between constructs.

#### Model Fit Assessment

The overall model fit was evaluated using commonly accepted goodness-of-fit indices, as shown in Table 2.

The model fit assessment was conducted using commonly accepted goodness-of-fit indices. A Chi-square/df value below 3 indicates acceptable model fit. The CFI and TLI values greater than 0.90 demonstrate good comparative and incremental fit of the model. Moreover, RMSEA and SRMR values below 0.08 confirm satisfactory approximation and residual fit, indicating that the proposed

theoretical model adequately fits the observed data.

### Structural Model Analysis

The structural model was performed on the bases of AMOS to test hypothesized relationships after the validation of the measurement model between Digital Green HRM and employee engagement.

The analysis estimated Path coefficients ( $\beta$  values), Significance levels (p-values), Strength and direction of relationships between constructs. The hypothesized relationships in the conceptual framework was confirmed by significant path coefficients.

### Mediation Analysis

The bootstrapping technique with 5000 resamples was used in AMOS to test the mediating effects of the sustainability awareness and green commitment. The statistics was took to be significant when confidence intervals do not cover zero,

which means that there are the effects of mediation.

### Ethical Considerations

Participation in the survey was voluntary. The purpose of the research explained to the respondents. All the information in the study was kept confidential and anonymous and the information was utilized only to conduct academic research.

### Results

This part describes the findings of the empirical research of the acquired data. The analysis involved demographic attributes of respondents, reliability analysis, confirmatory factor analysis, model fit criteria, structural model analysis and mediation analysis. It was analysed by means of SPSS as a preliminary analysis and AMOS as Structural Equation Modelling (SEM), as presented in the research methodology.

**Table 2:** Model Fit Assessment Criteria

Fit Index	Acceptable Value
Chi-square / df	< 3
Comparative Fit Index (CFI)	> 0.90
Tucker-Lewis Index (TLI)	> 0.90
Root Mean Square Error of Approximation (RMSEA)	< 0.08
Standardized Root Mean Square Residual (SRMR)	< 0.08

**Table 3:** Demographic Profile of Respondents (N = 400)

Variable	Category	Frequency	Percentage (%)
Gender	Male	220	55
	Female	180	45
Age	21-30 years	160	40
	31-40 years	150	37.5
	41-50 years	70	17.5
	Above 50 years	20	5
Sector	IT	150	37.5
	Manufacturing	120	30
	Service	130	32.5
Work Experience	Less than 5 years	140	35
	5-10 years	170	42.5
	More than 10 years	90	22.5

Note: IT= Information Technology; N= Number of Respondents.

### Respondent Profile

Demographic profile of respondents gives significant data regarding the nature of the sample that was used in the research. The knowledge of such attributes can be useful in assuring that the sample is reflective of the employees in

organisations that implement digital HR systems and sustainability measures.

In Table 3, the demographic profile shows that males constitute 55% of the respondents and females constitute 45%, which implies a fair gender balance among the respondents. Regarding

the age distribution, most of the respondents are between the age 21-30 (40%) and 31-40 years (37.5%) years, totalling up to 77.5% of the total sample. This implies that, majority of the respondents are young professionals who have higher chances of working in digitally advanced organizations.

As to the sectoral representation, the IT organizations represent the largest share of respondents (37.5%), the service sector (32.5%) and manufacturing firms (30%). The given distribution indicates the increasing trend of digital HR technologies and sustainability practices in various industries.

In the area of work experience, 42.5% of the respondents have 5-10 years of experience and 35% years of experience, which is why the largest share of the participants can be discussed as early-to mid-career employees actively engaged in digital transformation and sustainability efforts at the organization.

### Reliability Analysis

There was reliability analysis to determine the internal consistency of the measuring scales that were used in the study. Cronbach's Alpha was employed to consider the truthfulness of whether or not the items that measure each construct are constantly reflective of the desired variable.

In Table 4, the reliability findings indicate that all the constructs are found to possess Cronbach's Alpha values that are greater than the recommended value of 0.70, which means that there is great internal consistency among the items in the measurement. Specifically, the reliability value ( $\alpha = 0.90$ ), of Employee Engagement is the highest, which is an indication that the items employed to measure employee engagement are of high consistency. In the same manner, Digital Green HRM ( $\alpha = 0.88$ ), Green Commitment ( $\alpha = 0.87$ ), as well as Sustainability Awareness ( $\alpha = 0.85$ ) are also highly reliable. These findings indicate that scales of measurement employed in this study are valid and can be subjected to additional statistical procedures.

### Confirmatory Factor Analysis (CFA)

AMOS was used to conduct Confirmatory Factor Analysis (CFA) to test the measurement model and the correlation between observed variables and latent constructs. The convergent validity was measured by the factor loadings, the composite

reliability (CR) and average variance extracted (AVE) using the CFA results.

The findings show that all the factor loadings are above the recommended factor loading of 0.60 implying that the measurement items are representative of their respective constructs. Also, there are Composite Reliability (CR) values of between 0.86 to 0.91 which is well above the recommended threshold of 0.70. On the same note, the values of the Average Variance Extracted (AVE) lie within the range of 0.55 to 0.63 which is higher than the required minimum of 0.50. Such findings affirm that the measuring model is highly convergent valid, meaning that the items of each of the constructs have a significant amount of shared variance, as shown in Table 5.

### Model Fit Assessment

In order to analyze the suitability of the proposed research model to the observed data, a number of goodness-of-fit indices were tested. The results of the model fit in Table 6 show that the proposed structural model fits the data well. The value of Chi-square /df = 2.21 is less than the acceptable value of 3 meaning that the model fits well. In addition, the CFI [0.94] and TLI [0.92] figures are greater than the recommended value of 0.90 indicating a good comparative fit. The RMSEA of 0.056 and the SRMR of 0.049 are also considered to be in a viable range and one more time it proves that the model is appropriate to reflect the observed data, as shown in Figure 1.

### Structural Model Results

The proposed hypothesized relationship between the constructs was tested by means of Structural Equation Modelling (SEM). The results of the structural model in Table 7 indicate that Digital Green HRM positively impacts sustainability awareness ( $\beta = 0.62$ ) and green commitment ( $\beta = 0.54$ ). It means that digital and environmentally responsible HR practices in organizations result in the high level of awareness of the employees about the sustainability initiatives and commitment to the environmental objectives. Moreover, the awareness of sustainability ( $\beta = 0.41$ ) and the commitment to green ( $\beta = 0.46$ ) are also significant and positive contributors to employee engagement. These results indicate that the employees that are sensitive to sustainability programs and are dedicated to the environmental principles have a higher chance to show the increased rates of their engagement in their work.

Lastly, employee engagement ( $\beta = 0.29$ ), is another aspect of Digital Green HRM that was directly impacted positively, which proves that digital

green HR practices have a direct impact on an employee being more involved and enthusiastic about their work.

**Table 4:** Reliability Analysis

Construct	Number of Items	Cronbach's Alpha
Digital Green HRM	6	0.88
Sustainability Awareness	5	0.85
Green Commitment	5	0.87
Employee Engagement	6	0.90

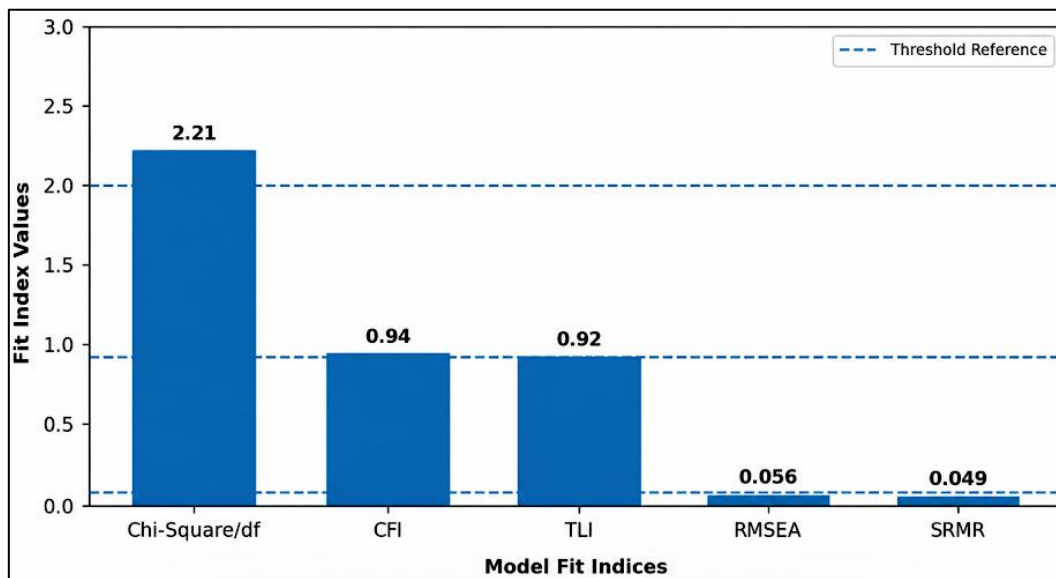
**Table 5:** Convergent Validity Results

Construct	Factor Loading	Composite Reliability (CR)	Average Variance Extracted (AVE)
Digital Green HRM	0.68 - 0.84	0.89	0.60
Sustainability Awareness	0.66 - 0.82	0.86	0.55
Green Commitment	0.70 - 0.85	0.88	0.59
Employee Engagement	0.72 - 0.88	0.91	0.63

**Table 6:** Model Fit Indices

Fit Index	Recommended Value	Obtained Value	Result
Chi-square/df	< 3	2.21	Acceptable
CFI	> 0.90	0.94	Good Fit
TLI	> 0.90	0.92	Good Fit
RMSEA	< 0.08	0.056	Good Fit
SRMR	< 0.08	0.049	Good Fit

Note: CFI= Comparative Fit Index; TLI= Tucker- Lewis Index; RMSEA= Root Mean Square Error of Approximation; SRMR= Standardized Root Mean Square Residual.



**Figure 1:** Structural Model fit Indices Comparison

**Table 7:** Structural Path Analysis

Hypothesis	Relationship	Path Coefficient ( $\beta$ )	p-value	Result
H1	Digital Green HRM → Sustainability Awareness	0.62	<0.001	Supported
H2	Digital Green HRM → Green Commitment	0.54	<0.001	Supported
H3	Sustainability Awareness → Employee Engagement	0.41	<0.001	Supported
H4	Green Commitment → Employee Engagement	0.46	<0.001	Supported
H5	Digital Green HRM → Employee Engagement	0.29	0.003	Supported

Note: ( $\beta$ )= Standardized Path coefficient;  $p < 0.05$  indicates statistical significance.

**Table 8:** Mediation Effects Analysis

Indirect Relationship	Indirect Effect	p-value	Result
Digital Green HRM → Sustainability Awareness → Employee Engagement	0.25	<0.001	Significant
Digital Green HRM → Green Commitment → Employee Engagement	0.24	<0.001	Significant

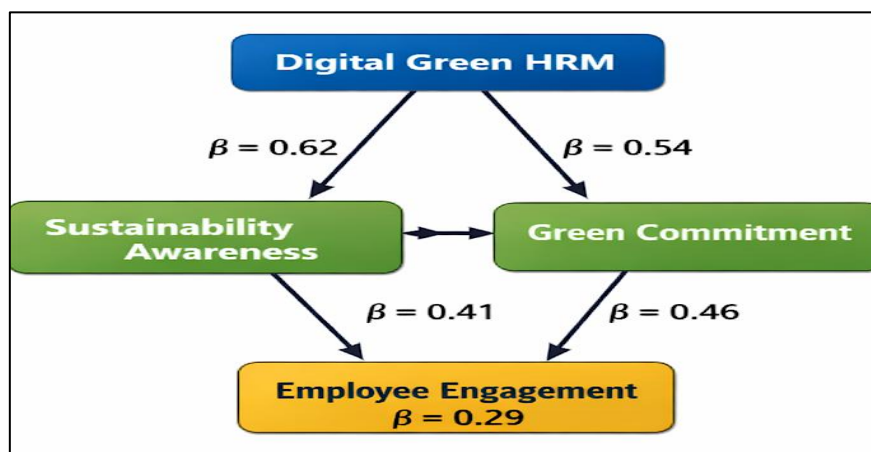
Note: Bootstrapping procedure with 5000 re-samples was used to assess mediation effects; All indirect effects were statistically significant at  $p < 0.05$ .

### Mediation Analysis

Bootstrapping analysis with 5000 resamples was performed to check the presence or absence of the mediation effect of sustainability awareness and green commitment between Digital Green HRM and employee engagement.

Results of the mediation analysis in Table 8 show that sustainability awareness and green commitment have significant mediation effects on the relationship between Digital Green HRM and employee engagement. This implies that Digital Green HRM does not only affect the engagement of employees in a direct way but also indirectly by making employees more aware of the sustainability practices and enhancing their commitment to environmental objectives.

Figure 2 illustrates the structural relationships among Digital Green HRM, Sustainability awareness, green commitment and employee engagement. The model indicates that Digital Green HRM positively influences sustainability awareness ( $\beta = 0.62$ ) and green commitment ( $\beta = 0.54$ ). Furthermore, sustainability awareness ( $\beta = 0.41$ ) and green commitment ( $\beta = 0.46$ ) significantly enhance employee engagement. The direct effect of Digital Green HRM on employee engagement ( $\beta = 0.29$ ) also confirms that environmentally responsible HR practices contribute to higher employee involvement and commitment within organizations.



**Figure 2:** Structural Model of Digital Green HRM and Employee Engagement

### Discussion

The research is an investigation on the impact of Digital Green HRM on employee engagement on sustainable workplaces with the mediating variables being sustainability awareness and green commitment.

Through the mediation analysis, it has been confirmed that Digital Green HRM has a direct and indirect impact on engagement through the following factors. On the whole, using digital technologies and green HR practices is the key to organizations and reciprocate by engaging in positive HRM behaviours. All hypothesized relationships were statistically significant yet the direct effect of Digital Green HRM towards

improving employee engagement and organizational sustainability in the long term.

Mediating roles of sustainability awareness and green commitment can be understood using AMO theory in which sustainability awareness is an increased ability to perform the task and green commitment is the motivation to meet organizations' sustainability goals. Again, Social Exchange Theory is consistent with the fact that employees react positively to Digital Green HRM in employee engagement was comparatively weaker ( $\beta = 0.29$ ) than the indirect pathways and thus, indicates that Digital Green HRM mostly affects employee engagement through psychological

mediators and not with regards to other behavioural outcomes. This suggests that the concept of sustainability awareness and green commitment are crucial explanatory mechanisms. The results of this study are aligned with the findings of experts who asserted the importance of Green HRM in creating sustainable employee behaviour and to digital HR efficiency (2, 16). This study, however, builds on previous research by combining these domains with Digital Green HRM and shows that digital technologies can have a profound impact on boosting sustainability-related HR outcomes. The findings are consistent with the experts as they showed that Green HRM positively affects environmental commitment and also build on their findings as digital platforms improve these relationships by communicating more effectively about sustainability (17). Digital Green HRM seems to be more scalable and accessible to employees than traditional HRM models. Results reveal that the use of digital training, digital communication and paperless systems through Digital Green HRM significantly enhances employees' sustainability awareness, supporting earlier findings that green HRM practices positively influence employees' environmental behaviour and organizational sustainability (29, 30)

Recent studies further confirm that AI-enabled and digital green HRM practices improve environmental engagement, green organizational climate and employee commitment toward sustainability goals (31, 32). Furthermore, employee engagement was significantly improved through sustainability awareness and green commitment, indicating that employees become more engaged when they perceive their work as meaningful and aligned with sustainability goals (33). It also positively influences green commitment by strengthening employees' emotional attachment and participation in environmentally responsible practices within organizations (32).

Strong indirect effects indicate that employee cognitive and emotional attachment to the sustainability goals could have stronger influence than the digital systems themselves and highlights the role of organisational culture in ensuring the maximum effectiveness of Digital Green HRM.

Through the AMO theory, the mediating effects of sustainability awareness and green commitment

can be explained as an improvement in the ability of employees, with sustainability awareness and an increase in motivation to achieve objectives regarding sustainability in the organization, with green commitment. Likewise, it is inferred that organizations raising the Digital Green HRM structure employees reciprocate in a positive manner by demonstrating increased engagement behaviours.

### **Practical Implications**

Organizations will benefit from: Paperless digital HR systems to reduce environmental impact, virtual sustainability training modules, integration of sustainability KPIs into digital appraisal systems and the use of cloud-based communication systems for sustainability awareness campaigns, as well as the introduction of green reward systems to boost employee environmental commitment and performance in the long run.

### **Limitations**

This study has several limitations, however. The cross-sectional design does not allow for causal interpretation of relations between Digital Green HRM, sustainability awareness, green commitment and employee engagement. Second, there may be common method bias and social desirability effects present in the data collected from self-reported surveys. Third, the sample was restricted to workers in specific industries which may limit generalizability to workers in other industries or in other cultures. Thirdly, digitalization and sustainability solutions are still in the process of evolving and may change over time in the future in relation to Digital Green HRM. Future studies can benefit from longitudinal designs, multi-source data and cross-cultural comparisons to enhance external validity and causal inferences.

### **Conclusion**

The conclusion of the present study highlights the significant role of Digital Green HRM in promoting sustainable workplaces and enhancing employee engagement in modern organizations. The study confirms that Digital Green HRM practices, including digital communication, online environmental training and paperless systems, positively influence employees' sustainability awareness and green commitment, which subsequently improve employee involvement and engagement. The findings demonstrate that organizations integrating digital technologies with

green HR practices are better positioned to create environmentally responsible work cultures while simultaneously improving workforce motivation and organizational effectiveness.

One of the major contributions of this study lies in identifying sustainability awareness and green commitment as important mediating mechanisms between Digital Green HRM and employee engagement. The study extends the existing sustainable HRM literature by providing empirical evidence that digitalized green HR practices not only support environmental sustainability but also strengthen employees' psychological attachment toward organizational sustainability goals. Thus, the research contributes theoretically by conceptualizing Digital Green HRM as a strategic organizational capability that promotes both ecological sustainability and workforce engagement in the evolving digital work environment.

From a practical perspective, the findings provide important implications for organizations, HR managers and policymakers. Organizations are encouraged to adopt digital HR systems, implement environmentally sustainable HR practices, provide online environmental training programs, communicate sustainability objectives through digital platforms and establish mechanisms to monitor employees' green performance. Such initiatives may help organizations improve environmental performance, employee satisfaction, organizational reputation and long-term sustainability outcomes. Furthermore, the study emphasizes that sustainable workplace practices supported by digital technologies can create a positive organizational climate that encourages employees to actively participate in green initiatives and environmentally responsible behaviors.

Despite its contributions, the study has certain limitations that should be acknowledged. The study was conducted within a limited sample and specific organizational context, which may restrict the generalizability of the findings to other industries or geographical regions. In addition, the cross-sectional nature of the research limits the ability to establish long-term causal relationships among the variables. The study also focused primarily on sustainability awareness and green commitment as mediators, while other organizational and behavioral factors may also influence employee engagement in sustainable workplaces.

Therefore, future research may conduct longitudinal and cross-industry studies to provide a deeper understanding of the long-term impact of Digital Green HRM practices. Future scholars may also examine the influence of emerging technologies such as artificial intelligence, HR analytics, automation and digital monitoring systems on sustainable HR practices and employee engagement. Moreover, additional variables such as leadership support, organizational culture, employee well-being, green innovation and organizational trust may be incorporated to further strengthen the understanding of sustainable workplace engagement in digitally evolving organizations. Overall, the study reinforces the growing importance of Digital Green HRM as a strategic approach for achieving both environmental sustainability and enhanced employee engagement in contemporary organizations.

### Abbreviations

AMO: Analysis of Moment Structures, E-HRM: Electronic Human Resource Management, HR: Human Resource, KPI: Key Performance Indicators, SPSS: Statistical Package for the Social Sciences.

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### Author Contributions

Damini Sharma: Conceptualization, Literature Review, Methodology Development, Data Interpretation, Research Design, Data Collection, Data Analysis, Manuscript Drafting, Aruna Dhamija: Critical Revision, Supervision, Review, Editing, Final Approval of the Manuscript. All authors have read and approved the final version of the manuscript and agree to be accountable for all aspects of the work.

## Conflict of Interest

The authors confirm that there are no financial, personal, institutional, or commercial relationships that could influence the work reported in this study.

## Data Availability

The data supporting the findings of this study are available from the corresponding author upon reasonable request. The data are not publicly available due to confidentiality and privacy considerations of the participants.

## Declaration of Artificial Intelligence

### (AI) Assistance

During the preparation of this manuscript, generative AI tools were used solely for language refinement, grammar correction and improving readability. The authors carefully reviewed, edited and validated all content to ensure the accuracy, originality and integrity of the final manuscript. The authors take full responsibility for the content of this publication.

## Ethics Approval

This study was conducted in accordance with ethical research standards. Participation was voluntary, informed consent was obtained from all respondents and anonymity and confidentiality were strictly maintained. No personally identifiable information was collected. As the study involved anonymous survey-based research with minimal risk, formal institutional ethical approval was not required as per applicable academic research guidelines.

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