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## Article

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# Greening the workforce: a systematic literature review of determinants in green HRM

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## ABSTRACT

This research sought to identify the factors that affect the adoption of Green Human Resource Management (Green HRM) within organizations, examining the subject from a theoretical and practical standpoint. The research used a systematic literature review methodology, employing the PRISMA guidelines to retrieve 26 articles that fulfilled the criteria. The findings indicate that contemporary Green HRM research concentrates on eight determinants. Nonetheless, the study identifies inconsistencies in the data; some evidence points to the significance of these determinants in promoting an organization's Green HRM practices and overall sustainability, while at least one study suggests the relationship between specific determinants and Green HRM practices is not significant. However, there needs to be more focus on the context of Green HRM and the practicality of industrial relations within the organization and industries. This research aims to serve as a foundation for future investigations into this subject area, particularly as it relates to the decision-making process, which includes the existing industrial relations and prioritizing Sustainable Development Goals (SDG) in the strategic greening of human resources. Hence, there is an urgent demand for more Green HRM with sustainable practices, enhanced corporate governance, inclusive employee engagement approaches, and industrial relations.

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Human Resource Management;  
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Corporate Governance

## JEL CLASSIFICATION:

**M54** (labor management);  
**Q56** (environmental economics; sustainability)

## 1. Introduction

Recent research highlights the importance of aligning **Human Resource Management (HRM)** with environmental goals to foster organizational sustainability and achieve eco-friendly outcomes (Hooi et al., 2022; Roscoe et al., 2019). The concept of **Green HRM** has gained attention for its dual focus on environmental and socio-economic aspects of corporate practices (Rizvi & Garg, 2021). Studies by Ali et al. (2020) and I Ketut Gede and Sulistyaningsih (2023) emphasize that incorporating sustainability-focused HR practices is essential for addressing ecological concerns while maintaining organizational performance.

**Green HRM** initiatives, such as pro-environmental policies, have been shown to deliver tangible outcomes, including **waste reduction** (Robertson & Barling, 2013) and enhanced **ecological efficiency** (Saeed et al., 2019). These initiatives help organizations build an environmentally conscious corporate culture (Muster & Schrader, 2011) and engage employees in ecological activities (Mishra, 2017). For example, Raut et al. (2020) demonstrated how effective environmental policies integrated into HR strategies promote pro-environmental actions among employees (Gilal et al., 2019).

While significant progress has been made, this study addresses an important gap in the literature. Many previous works have focused on individual HR components, such as **green recruitment** (Guerci & Carollo, 2016) or **employee involvement in sustainability initiatives** (Jabbour & Santos, 2008; Ones & Dilchert, 2012). However, there is a need for a more **holistic approach** to Green HRM, where these

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practices are viewed as part of an integrated system rather than as separate, isolated elements (Longoni et al., 2018). By treating Green HRM as a **unified framework**, this study seeks to explore how different HR functions—recruitment, training, performance management, and employee development—can work collectively to promote sustainability.

Furthermore, this research explores the role of **industrial relations and contextual factors** in the success of Green HRM adoption, an area that remains underexplored in current literature. Specifically, we focus on how Green HRM practices can be better integrated with **sustainability frameworks**, such as the **Sustainable Development Goals (SDGs)**, to drive both environmental and organizational outcomes. This broader perspective addresses the complexities of implementing Green HRM in different organizational settings, providing a comprehensive framework for future research.

This study, therefore, contributes to the literature by offering a more integrated understanding of **Green HRM** as a system of interconnected practices, with an emphasis on the role of industrial relations, sustainability goals, and organizational performance. By addressing these gaps, this research provides a foundation for future studies that seek to evaluate the **long-term impact of Green HRM** on organizational sustainability.

## 2. Methodology

The research methodology follows the **PRISMA framework** (Preferred Reporting Items for Systematic Reviews and Meta-Analyses), a widely recognized protocol for conducting **Systematic Literature Reviews (SLR)**. The PRISMA guidelines provide a structured and transparent approach to ensure the trustworthiness and reproducibility of systematic reviews (Nurbayani et al., 2022; Yulianty & Senen, 2023).

### 2.1. Definition

Green HRM in this research refers to aligning HR practices with environmental management goals to promote sustainability within organizations. This includes green recruitment, training, performance management, and compensation strategies aimed at reducing the organization's environmental impact and fostering an eco-friendly culture among employees. Recent research highlights the role of Green HRM in driving sustainability by integrating these practices with the organization's overall environmental goals, encouraging behaviors that reduce resource use and carbon emissions (Faisal, 2023; Xie & Lau, 2023).

The concept has gained significant attention recently, especially due to the increasing need for organizations to adopt green initiatives to meet both environmental regulations and stakeholder expectations. Studies show that Green HRM practices enhance employee motivation to engage in eco-friendly behaviors, contributing to both organizational sustainability and competitive advantage (Shahzad et al., 2023).

### 2.2. Data collection and sampling

The data collection process involved a comprehensive search of academic databases, including **Google Scholar and Crossref**, to identify relevant studies published between 2015-2023 to highlight the most current trends and empirical findings. The search used a combination of keywords such as 'Green HRM,' 'sustainability,' 'employee engagement,' and 'organizational performance.' We included articles that met specific inclusion criteria, such as peer-reviewed journal publications in English, addressing Green HRM in the context of organizational sustainability.

The **sampling technique** employed for this study was **purposive sampling**, focusing on articles that contributed directly to the understanding of Green HRM adoption and its impact on sustainability outcomes. Articles that did not meet the inclusion criteria, such as conference papers, book chapters, and non-peer-reviewed sources, were excluded to maintain the quality and rigor of the review.

### 2.3. Potential biases

We recognize that potential biases could arise in the data collection process. First, there is **publication bias**, where studies with significant or positive results are more likely to be published, which may skew the review toward favorable findings regarding Green HRM. To mitigate this, we attempted to include

studies with both significant and non-significant findings. Second, there is the possibility of **selection bias**, given that the literature review relied on studies published in English, which could exclude relevant research in other languages. Additionally, the reliance on certain databases may have limited the scope of the articles included in the review.

By addressing these potential biases and clearly outlining the data collection process, the methodology ensures transparency and allows for the reproducibility of results.

## 2.4. Research question formulation

This study's research question framing utilizes the PICO format, a mnemonic that outlines the key components of 'Population,' 'Intervention,' 'Comparator,' and 'Outcomes' (Lockwood et al., 2015). Using this structure, the study narrows its focus to three key elements: the organizations that have adopted Green HRM practices (Population), the elements that drive the adoption of these practices (Intervention), and Improved sustainability performance, employee engagement, and environmental responsibility within organizations practicing Green HRM (Outcomes). In this context, the Comparator was not applicable. Guided by PICO, the main RQ posed was: 'What key determinants influence implementing Green HRM practices in organizations?'

## 2.5. Searching strategies and identification

This study's document retrieval process was carefully designed and implemented according to the structured three-phase method of identification, screening, and determining eligibility, as outlined by Shaffril et al. (2021). Applying this structured procedure enabled the authors to thoroughly search for and compile studies, thus ensuring a systematic literature review (SLR) that was well-organized and transparent. Furthermore, the authors began by selecting pertinent keywords and constructing a Boolean search query: 'GHRM, Green HRM, green human resource management, sustainable performance, green competitive advantage, GHRM drivers, and GHRM challenges.' These keywords were used in advanced search techniques incorporating field codes, functions, phrase searching, wildcards, truncation, and Boolean operators within the journal indexed by Crossref and Google Scholar databases. The choice of these databases was informed by their frequent citation in previous Green HRM research, notably by Chaudhary (2020) and Tseng et al. (2019). The study also acknowledges the possibility of duplicate listings across different databases. The selected database utilized a defined search string, as mentioned in Table 1.

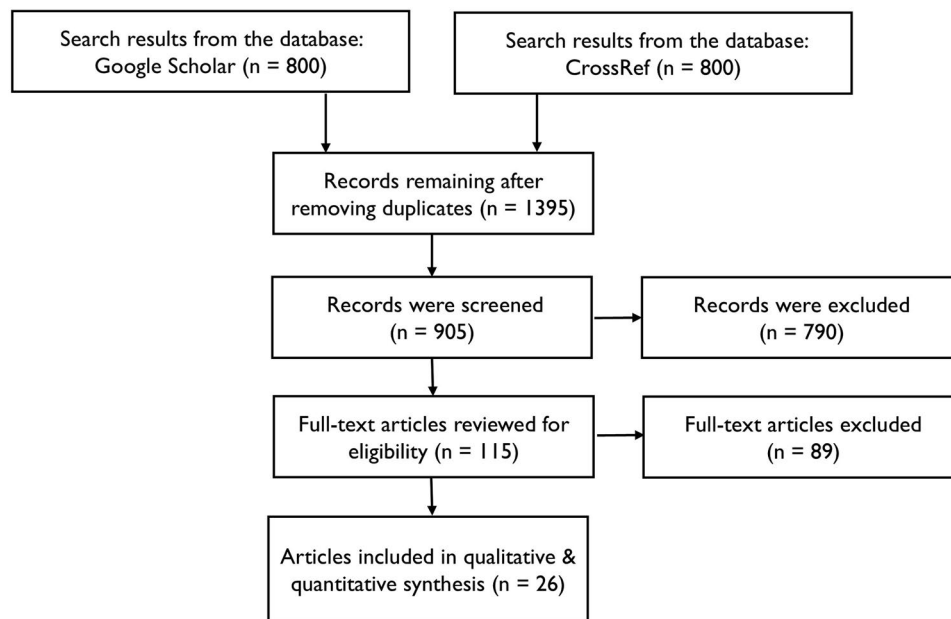
Crossref contributed 800 articles, and Google Scholar also contributed 800 articles. All 1600 articles identified for potential relevance involved a rigorous filtering process using specific criteria. This process was guided by the structured approach of the PRISMA flow diagram (referenced in Figure 1).

## 2.6. Screening

The second step involved screening, during which articles were selected for inclusion or exclusion through database filters or manual evaluation by the authors. Initially, a pool of 1600 articles was compiled from the two diverse scientific databases. However, this number was refined to 1395 titles following the first screening phase manually by the authors. Subsequently, the selection was refined using a

**Table 1.** The selected database utilized a defined search string.

Database	String – Keywords
Crossref	(Green HRM OR Green Human Resource Management OR Sustainable HRM OR Sustainable Human Resource Management OR Environmental HRM OR Environmental Human Resource Management, Workforce Greening) AND (Determinants OR Factors OR Drivers OR Influences)
Google Scholar	('factor*' OR 'challenge*' OR 'motivation*' OR 'driver*' OR 'drive*' OR 'critical factor*' OR 'critical success factor*' OR 'success factor*' OR 'key factor*' OR 'CSF' OR 'determinant*') AND (Green HRM OR Green human resource management)



**Figure 1.** Flow diagram of PRISMA methodology.

defined set of Inclusion Criteria (IC), in line with the guidelines for conducting a systematic literature review, as follows:

IC1: the research period spanned from 2015 to 2023

IC2: the research focused on identifying the determining factors for implementing Green HRM

IC3: only original, peer-reviewed articles written in English were considered

IC4: the research had to be based on empirical data, employing either quantitative or mixed-method research methodologies

This step aims to curate the articles collected from the database, following the approach outlined by Ratner et al. (2023). In alignment with the ‘research field maturity’ framework posited by Kraus et al. (2020), the coverage of this review was specified to articles published between the years 2015 and 2023 to highlight the most current trends and empirical findings. During the screening phase, 790 articles were deemed unsuitable and were consequently excluded due to their nature as conference proceedings, book chapters, theses, or other formats not meeting the criteria. This refined the pool to 905 articles suitable for the next assessment phase.

## 2.7. Eligibility

At this review stage, a detailed appraisal is essential for articles that have met the preliminary selection criteria. This entails a full-text review to verify the inclusion of all critical components in the research. This rigorous process is crucial in confirming the articles’ relevance and quality, and any exclusions during this phase must be justified to avoid bias (Tawfik et al., 2019). Articles with a limited focus on Green HRM strategies are typically excluded from further consideration. Following this rigorous screening, 115 articles were identified as meeting the established criteria and were carried forward. The process typically involves detailed steps for screening and determining the eligibility of articles. Using reference management tools like **Mendeley** can streamline this process to organize and assess the relevance of the articles (Haddaway et al., 2017). Only 26 articles were selected for in-depth examination and inclusion in the combined qualitative and quantitative analysis, as illustrated in Figure 1.

## 2.8. Quality appraisal

The research utilized the Mixed-Methods Appraisal Tool (MMAT) developed by Hong et al. (2018) to ensure rigorous quality control and a robust review process. It systematically reviews five types of study designs: qualitative research, randomized controlled trials, non-randomized studies, quantitative

**Table 2.** The criteria used to determine the rigor of the methodology and analysis used in the selected articles.

Research design	Assessment criteria	
Qualitative (QL)	QA1	Is the qualitative approach appropriate to answer the research question?
	QA2	Are the qualitative data collection methods adequate to address the research question?
	QA3	Are the findings adequately derived from data?
	QA4	Is the interpretation of results sufficiently substantiated by data?
	QA5	Is there coherence between qualitative data sources, collection, analysis, and interpretation?
Quantitative (descriptive) QN (DC)	QA1	Is the sampling strategy relevant to address the research question?
	QA2	Is the sample representative of the target population?
	QA3	Are the measurements appropriate?
	QA4	Is the risk of non-response bias low?
	QA5	Is the statistical analysis appropriate to answer the research question?
Quantitative (non-randomised) QN (NR)	QA1	Are the participants representative of the target population?
	QA2	Are measurements appropriate regarding both the outcome and intervention (or exposure)?
	QA3	Are there complete outcome data?
	QA4	Are the confounders accounted for in the design and analysis?
	QA5	During the study period, is the intervention administered (or exposure occurred) as intended?
Mixed Methods. MX	QA1	Is there an adequate rationale for using a mixed methods design to address the research question?
	QA2	Are the different components of the study effectively integrated to answer the research question?
	QA3	Are the outputs of the integration of qualitative components adequately interpreted?
	QA4	Are divergences and inconsistencies between quantitative and qualitative results adequately addressed?
	QA5	Do the different components of the study adhere to the quality criteria of each tradition of the methods involved?

QA: quality assessment.

Source: Hong et al. (2018)

descriptive studies, and mixed methods studies. Initially, each selected study underwent a two-step screening process to determine its eligibility for quality assessment. This preliminary screening ensured that only studies pertinent to the research questions advanced to the detailed appraisal stage. In the quality assessment phase, the studies were evaluated against five principal criteria tailored to their specific research designs, including the alignment of research questions with the data collected, the coherence between data sources and analysis, and the appropriateness of the analytical techniques used. For quantitative studies, specific attention was given to the sampling strategy's relevance, the samples' representativeness, and the measurement techniques' adequacy. Mixed-method studies were assessed for the justification of their design choice, effectiveness in integrating and contrasting qualitative and quantitative findings, and their overall capacity to address research objectives comprehensively. The assessment process involved meticulous scrutiny by co-authors and the corresponding author, focusing primarily on each article's methodological and analytical rigor (see Table 2). The authors employed MMAT's guidance to evaluate the consistency of the methodologies applied across studies, such as sampling techniques and analytical approaches. Each article was rated against the MMAT criteria using a three-option scale: 'yes,' 'no,' and 'do not know/cannot tell.' Articles had to meet at least three of the five criteria to be included in the review.

The collaborative assessment ensured that any methodological disagreements were resolved through discussion, leading to a consensus on each article's quality. Ultimately, 26 articles met all five criteria, seven satisfied at least four, and four achieved a minimum of three criteria, affirming the rigorous methodological standards set for this review (see Table 3).

### 3. Result and discussion

#### 3.1. Research results and qualitative synthesis

Utilizing targeted keywords, a search in the Crossref and Google Scholar databases yielded 1395 articles published between 2015 and 2023 (IC1), all in English (IC3). After a preliminary selection process considering titles, abstracts, and keywords aligned with specific inclusion criteria (IC2 and IC3), 905 articles were identified. Further scrutiny, including full reading based on determinant factors and research methods, narrowed the field to 115 articles. Subsequent in-depth analysis left 26 articles for closer examination. Publications on Green HRM have been regular since 2015, with qualitative and quantitative research methods represented, underscoring the ongoing relevance of Green HRM studies in recent years. Table 4 provides a compilation of these studies.



### 3.2. Systematization of determinants

Out of the 26 articles selected, the study closely examined the determinants of Green HRM using additional criteria: 1). Green HRM was positioned as the dependent variable; 2). Green HRM practices encompassed various approaches, including green recruitment and selection, green training and development, green performance management and appraisal, green rewards and compensation, and green empowerment, all treated as dependent variables; 3). Only determinants investigated in at least three separate articles and acted as independent variables were included in the results; 4). The scope of the research was confined to corporations or their parent entities; 5). Studies where determinants were linked to national factors were not included; 6). Studies with determinants specific to particular industry sectors were also omitted.

Adhering to the above specifications, the determinants, findings, conclusions, and associated references concerning Green HRM have been compiled in Table 5.

### 3.3. Variable determinants

The 26 articles selected for the study, as presented in Tables 4 and 5, identified eight key factors that drive Green HRM. These determinants are comprehensively listed below.

#### 3.3.1. Green transformational leadership

This determinant was used in 14 studies. Studies such as (Zameer et al., 2022), (Kim et al., 2017), Afsar et al. (2016), and Saeed et al. (2019) highlight the critical role of green transformational leadership in promoting pro-environmental behavior by tapping into employees' core motivations and spiritual

**Table 3.** Result of the quality assessment.

No	Study	Research Design	QA1	QA2	QA3	QA4	QA5	Number of criteria fulfilled	Inclusion in the review
1	Zameer et al., 2022	QN(DC)	√	√	√	√	√	5/5	√
2	Afsar et al., 2016	QN(DC)	√	√	√	√	√	5/5	√
3	Xu et al.	QN(NR)	√	√	C	√	√	4/5	√
4	Haldorai et al., 2022	QN(DC)	√	√	√	√	√	5/5	√
5	Grabara et al., 2019	QN(NR)	C	√	√	C	√	3/5	√
6	Song & Yu, 2018	QN(DC)	√	√	√	√	√	5/5	√
7	Papa et al., 2020	QN(DC)	√	√	√	√	√	5/5	√
8	Guerci et al.	QN(NR)	√	C	√	√	√	4/5	√
9	Djaelaniet al., 2021	QN(DC)	C	√	C	√	√	3/5	√
10	Dubey et al., 2015	QN(DC)	√	√	√	C	√	4/5	√
11	Mtembu, 2019	MX	√	√	C	√	C	3/5	√
12	Al-Romeedy, 2019	QN(NR)	√	C	C	√	√	3/5	√
13	Fernando et al., 2019	QN(DC)	√	√	√	C	√	4/5	√
14	Hanaysha, 2016	QN(DC)	√	√	√	C	√	4/5	√
15	Roscoe et al., 2019	QN(DC)	√	C	√	√	√	4/5	√
16	Kim et al., 2017	QN(NR)	√	√	√	√	√	5/5	√
17	Usman et al.	QN(DC)	√	√	√	√	√	5/5	√
18	Yong et al., 2019	QN(DC)	√	√	√	√	√	5/5	√
19	Pham et al., 2019	MX	√	√	√	C	√	4/5	√
20	Dangelico, 2016	QL	√	√	√	√	√	5/5	√
21	Valkengoed	QN(NR)	√	√	√	√	√	5/5	√
22	Dumont et al., 2017	MX	√	√	√	√	√	5/5	√
23	Weng et al., 2015	QN(DC)	√	√	√	√	√	5/5	√
24	Singh et al., 2020	QN(DC)	√	√	√	√	√	5/5	√
25	Saeed et al., 2019	MX	√	√	√	√	√	5/5	√
26	Davidescu et al., 2020	MX	√	√	√	√	√	5/5	√

QA: quality assessment; QN (DC): quantitative descriptive; QN (NR): quantitative non-randomised; QL: qualitative; MX: mixed-method; C: Can't tell.

Source: data - processed by the authors, 2023/2024



**Table 4.** List of articles and qualitative synthesis.

No	Years	Author	Journal – Publisher	Topic	Purpose
1	2022	Zameer et al.	Management Decision - Emerald	The study covers business analytics, environmental orientation, green competitive advantage, and green innovation.	This paper aims to examine how business analytics and environmental strategies contribute to the development of green innovation and green competitive.
2	2016	Afsar et al.	Journal of Environmental Psychology – Elsevier	The study includes spiritual leadership, and employee pro-environmental behavior.	This study developed and examined a theoretical framework that connects spiritual leadership to employees' eco-friendly behavior.
3	2022	Xu et al.	Frontiers in Environmental Science - Frontiers	The study focus on the impact of foreign trade on GTFEE in China.	The study explore the impact of international trade on China's GTFEE.
4	2022	Haldorai et al.	Tourism Management - Elsevier	The study include top management's green commitment and green intellectual capital, for hotel environmental performance.	The research explored how the dedication of top management to environmental initiatives and the collective green knowledge within an organization affect the Green HRM practices and environmental performance.
5	2019	Grabara et al.	Polish Journal of Management Studies - Ministry of Education and Science of the Republic of Poland	This study covers the significance of the human factor in the successful implementation of new management solutions.	The research examines the phases of industrial evolution, the distinct management tactics at each stage, and how these affect workers.
6	2018	Song & Yu	Responsibility and Environmental Management - Wiley	This study addresses the relationship between green innovation strategy, green creativity, and green organizational identity.	Drawing on theories of organizational identity and creativity, this research constructs a theoretical framework to elucidate the strategy behind green innovation.
7	2020	Papa et al.	Journal of Knowledge Management - Emerald	This study covers innovation performance, knowledge acquisition, employee retention and HRM practices.	The objective of this paper is to investigate how knowledge acquisition impacts innovation performance.
8	2016	Guerce	International Journal of Human Resource Management - Taylor & Francis	This Green HRM study includes stakeholder pressures, environmental performance.	This paper adds to the existing body of work Green HRM by leveraging the practical significance of stakeholder theory. It suggests that stakeholders influence corporate decisions.
9	2021	Djaelaniet al.,	Management Science Letters – Growing Science	This study uses variables spiritual leadership, job satisfaction, organizational commitment and organizational citizenship behavior.	The aim of this research was to explore the connection between spiritual leadership and the job attitudes and organizational citizenship behaviors of faculty members at an Islamic University.
10	2015	Dubey et al.	International Journal of Production Economics - Elsevier	This study covers the leadership, operational practices, institutional pressures, and environmental performance for green supply chain	This paper's goal is to assess how supplier relationship management and total quality management affect environmental performance, considering the role of leadership and the moderating effect of institutional pressures.
11	2019	Mtembu	Problems and Perspectives in Management - Academia	This study concentrated on Green HRM practices and their implementation.	The main aim of this study were to ascertain if there exists a link between the understanding of Green HRM practices and their actual application in organizations
12	2019	Al-Romeedy	Journal of Human Resources in Hospitality & Tourism - Taylor & Francis	This study focus on Green HRM practices in Egyptian travel agencies.	The research focused on determining how widely Green HRM practices are adopted and identifying the challenges to their implementation, and pinpointing the key necessities for successful adoption.
13	2019	Fernando et al.	Resources, conservation, and recycling - Elsevier	Thus study covers green growth technology, environmental innovation and sustainable business performance.	This research broadens the understanding of green business practices through an exploration of a novel conceptual framework.
14	2016	Hanaysha	Procedia-Social and Behavioural Sciences - Elsevier	This study uses employee empowerment, teamwork, employee training, and organizational commitment as variables.	The purpose of this research is to explore how the variables used influence organizational commitment.

(Continued)

Table 4. Continued.

No	Years	Author	Journal – Publisher	Topic	Purpose
15	2019	Roscoe et al.	Business Strategy and the Environment - Wiley	This study covers Green HRM practice, green organizational culture, environmental performance for sustainable development	The study investigates how Green HRM practices and factors that foster a green organizational culture contribute to a company's environmental performance.
16	2017	Kim et al.	Journal of Management - Sage	This research covers individual differences, leader behavior, and co-workers advocacy.	The research crafted and evaluated a multi-layered model to clarify why employees choose to participate in eco-friendly actions of their own accord within the workplace.
17	2023	Usman et al.	Human Resource Management - Wiley	This study includes sustainable environment, green training, and employees' eco-friendly behaviors.	The research investigates how green training influences employees' environmentally friendly behaviors beyond the workplace, both directly and indirectly through a sense of connection to nature.
18	2019	Yong et al.	Journal of Cleaner Production - Elsevier	This Green HRM study covers green intellectual capital.	The study explored the connection between green intellectual capital and the practices of Green HRM.
19	2019	Pham et al.	Tourism Management - Elsevier	This study focus on greening the hospitality industry.	The research constructs and evaluates the direct and synergistic impacts of Green HRM practices on Organizational Citizenship Behavior for the Environment (OCBE).
20	2016	Dangelico	Business Strategy and the Environment - Wiley	This study concentrated on green product innovation.	This study reviews the body of knowledge on the topic by identifying the antecedents, the outcomes, and the success factors for Green Product Innovation (GPI) development.
21	2019	Valkengoed	Nature climate change - Nature	This study covers factors motivating climate change adaptation behavior	Conduct a series of meta-analyses to examine how motivational factors relate to various adaptation behaviors.
22	2017	Dumont et al., 2017	Human resource management - Wiley	This study focus on Green HRM practices with the role of psychological green climate and employee green values.	The relatively new idea of Green HRM has been theorized to have an impact on the eco-friendly behaviors of employees at work.
23	2015	Weng et al.	Sustainability - MDPI	Topic of this study includes green innovation, environmental and corporate performance, as stakeholder perspective	The research investigated the effects of various factors on green innovation and the resulting impact on performance.
24	2020	Singh et al.	Technological forecasting and social change - Elsevier	This Green HRM's study relates green innovation and environmental performance, and green transformational leadership.	The research explored the role of Green HRM in mediating the relationships among green transformational leadership, green innovation, and environmental performance.
25	2019	Saeed et al.	Corporate Social Responsibility and Environmental Management - Wiley	This Green HRM practices promotes employee's pro-environmental behavior.	The research seeks to investigate how various Green HRM practices, impact the eco-friendly behaviors of employees.
26	2020	Davidescu et al.	Sustainability - MDPI	This sustainable HRM's study covers work flexibility, job satisfaction, and job performance among Romanian employees.	The paper focuses on evaluating the effects of various forms of flexibility and emphasizes the significance of employee development and adaptability as key components of sustainable HRM that enhance overall employee job satisfaction.

Source: data - processed by the authors, 2023/2024

connections. Haldorai et al. (2022) and Singh et al. (2020) emphasize that top management's endorsement of green initiatives significantly embeds Green HRM principles throughout the organization, a sentiment echoed by Pham et al. (2019) regarding management's role in environmental performance. Song and Yu (2018) and Fernando et al. (2019) note the importance of green innovation strategies for regulatory compliance, while Djaelani et al. (2020) link spiritual leadership to organizational commitment and citizenship behaviors beneficial to the environment. However, Al-Romeedy (2019) identifies challenges such as inadequate support for Green HRM and insufficient incentives. Leaders' embodiment of environmental values is essential for shaping organizational culture and aligning it with sustainable practices, as discussed by Dubey et al. (2015), Roscoe et al. (2019), Kim et al. (2017), and Davidescu et al. (2020).

**Table 5.** Determinants of green HRM.

No	Determinant	Result	Conclusion	Practical Implication	Resources
1	Green transformational leadership	Leader green behavior impacts subordinates directly and indirectly through green advocacy.	The eco-friendly actions of leaders directly affect the environmental behaviors of their team members.	Recruiting & training based on individual factors can enhance organizational environmental performance; Company managers should invest in this area.	(Afsar et al., 2016; Al-Romeedy, 2019; Davidescu et al., 2020; Djaelani et al., 2020; Dubey et al., 2015; Fernando et al., 2019; Haldorai et al., 2022; Kim et al., 2017; Pham et al., 2019; Roscoe et al., 2019; Saeed et al., 2019; Singh et al., 2020; Song & Yu, 2018; Zameer et al., 2022)
2	The human factor	Support innovative management policies and are willing to learn new skills	Future employees support innovative management and are ready to learn.	Emphasizes the importance of innovative management for enterprise development. Highlights the need for proper management to ensure employee satisfaction	(Afsar et al., 2016; Davidescu et al., 2020; Djaelani et al., 2020; Dumont et al., 2017; Grabara et al., 2019; Haldorai et al., 2022; Hanaysha, 2016; Kim et al., 2017; Pham et al., 2019; Roscoe et al., 2019; Saeed et al., 2019; Singh et al., 2020; Weng et al., 2015)
3	Organizational commitment to sustainability	Collaboration within teams positively and notably influences the level of commitment to an organization.	Confirmatory factor analysis validated the reliability and coherence of the measurements employed in the study.	Focus on training programs to improve employee skills and knowledge.	(Dangelico, 2016; Davidescu et al., 2020; Djaelani et al., 2020; Dubey et al., 2015; Haldorai et al., 2022; Hanaysha, 2016; Kim et al., 2017; Mtembu, 2019; Pham et al., 2019; Saeed et al., 2019; Singh et al., 2020; Song & Yu, 2018)
4	Knowledge acquisition	Knowledge acquisition positively impacts innovation performance, moderated by HRM practices.	Acquiring knowledge positively influences innovative performance.	HRM practices influence organizational climate, fostering innovation and knowledge sharing.	(Afsar et al., 2016; Al-Romeedy, 2019; Dangelico, 2016; Davidescu et al., 2020; Dumont et al., 2017; Guerci et al., 2016; Haldorai et al., 2022; Hanaysha, 2016; Papa et al., 2020; Pham et al., 2019; Saeed et al., 2019; Yong et al., 2019)
5	Environmental orientation (policies and practices)	Environment orientation through outcomes of Green product innovation (GPI) includes cost savings, competitive advantage, and increased sales.	The benefits of implementing GPI encompass reductions in expenses, gaining a competitive edge, and an upsurge in sales.	Emphasize managerial decisions related to green competitive advantage.	(Al-Romeedy, 2019; Dumont et al., 2017; Fernando et al., 2019; Saeed et al., 2019; Song & Yu, 2018; Zameer et al., 2022)
6	Green innovation pressure	Technological advancements, business analytics, and a focus on environmental factors are critical drivers of green innovation.	Business analytics positively impacts green innovation and competitive advantage. Green innovation positively impacts environmental and corporate performance.	Decision-makers should focus on business analytics for green innovation.	(Fernando et al., 2019; Grabara et al., 2019; Papa et al., 2020; Song & Yu, 2018; Weng et al., 2015; Zameer et al., 2022)
7	Market demand and competitive pressure	Factors driving GPI include competitive advantage, cost reduction, and market benefits.	Elements propelling GPI forward encompass gaining a market edge, decreasing costs, and reaping market rewards.	Provides insights for companies, and policy makers.	(Fernando et al., 2019; Guerci et al., 2016; Singh et al., 2020; Weng et al., 2015)
8	Corporate Social Responsibility (CSR)	Green training was identified as a key mechanism for organizational citizenship behavior for the environment (OCBE)	Environmental awareness training plays a crucial role in promoting employees' voluntary participation in eco-friendly activities.	Training focused on sustainability is key to encouraging voluntary eco-friendly actions among employees.	(Weng et al., 2015; Yong et al., 2019)

Source: data - processed by the authors, 2023/2024

### **3.3.2. The human factor**

This determinant was used in 13 studies. Afsar et al. (2016), Weng et al. (2015), and Saeed et al. (2019) emphasize the impact of a culture change toward conscientiousness, suggesting that employees who perceive organizational solid support for their spiritual aspects are more influenced by spiritual leaders at work. Involving employees in sustainability initiatives is vital, as confirmed by Grabara et al. (2019), Pham et al. (2019), and Singh et al. (2020), with employee contributions to environmental practices being integral to workplace changes. Dumont et al. (2017) highlight the importance of participation in activities such as waste reduction, while Davidescu et al. (2020), Haldorai et al. (2022), and Weng et al. (2015) note that fostering a culture of environmental awareness and supportive behaviors is essential for sustainability. Furthermore, Djaelani et al. (2020), Hanaysha (2016), and Roscoe et al. (2019) recognize human resources as a critical factor in nurturing a high-quality environment.

### **3.3.3. Organizational commitment to sustainability**

The dedication to sustainability by an organization, which Haldorai et al. (2022) and Kim et al. (2017) have found to be critical, was addressed in 12 studies. This commitment is especially significant at the management level and vital to incorporating sustainable practices into corporate culture and HR protocols. Song and Yu (2018) suggest that a solid green identity within a firm is fundamental to boosting awareness and innovation in green practices. Furthermore, Dangelico (2016) and Djaelani et al. (2020) observed that such organizational commitment positively impacts job satisfaction and promotes Organizational Citizenship Behavior (OCB). This interplay of institutional pressures and leadership's influence on operational practices and enhancing environmental performance is also highlighted by Dubey et al. (2015), Singh et al. (2020), Davidescu et al. (2020), and Saeed et al. (2019). Finally, Hanaysha (2016) and Mtembu (2019) stress the importance of strategic commitment to greening from the highest to the lowest levels within an organization.

### **3.3.4. Knowledge acquisition**

This determinant was used in 12 studies. Educating staff on environmental issues and emphasizing the importance of ecological responsibility may enhance pro-environmental behavior (Afsar et al., 2016). Offering adequate training and opportunities for involvement in green initiatives could also improve environmental performance (Haldorai et al., 2022). Papa et al. (2020) and Saeed et al. (2019) mentioned the positive impact of knowledge acquisition on innovation performance, with employee retention further strengthening this effect by fostering commitment and trust, thus nurturing an innovation culture. Training and development focused on environmental awareness and sustainability practices help cultivate a knowledgeable and skilled workforce in sustainability issues (Dangelico, 2016; Yong et al., 2019). Guerri et al. (2016), Hanaysha (2016), and Pham et al. (2019) revealed that green training, participation, performance management, and rewards positively influence environmental performance. Additionally, Davidescu et al. (2020), Dumont et al. (2017), and Mtembu (2019) affirmed that having Green HRM policies and knowledge can impact the implementation of Green HRM within organizations, emphasizing the necessity of providing knowledge, training, and rewards for those involved in green initiatives (Al-Romeedy, 2019).

### **3.3.5. Environmental orientation (policies and practices)**

This determinant was used in 6 studies. Environmental orientation positively influences green innovation and competitive advantage (Zameer et al., 2022). Managers are crucial in effectively implementing their company's environmental policies and green innovation strategies (Song & Yu, 2018). Developing and executing ecological policies and practices aligned with organizational sustainability objectives is essential (Fernando et al., 2019). Dumont et al. (2017) also noted the importance of integrating environmental considerations into HR policies and incorporating environmental responsibilities into job descriptions. Adherence to environmental laws and regulations at various levels catalyzes organizations to adopt Green HRM practices (Saeed et al., 2019). Additionally, ecological orientation and innovation are anticipated to become crucial performance metrics for future competitive advantages (Zameer et al., 2022).

Al-Romeedy (2019) highlighted the absence of clear environmental policies in certain agencies and a lack of effort to attract environmentally interested workers in his study.

### **3.3.6. Green innovation pressure**

Six studies highlight the determinant of green innovation pressure. Zameer et al. (2022) discuss a mechanism showing how green innovation impacts business, pointing to the vital roles of business analytics and environmental orientation in promoting green innovation and competitive edge. Saeed et al. (2019) emphasize the necessity for HRM strategies to evolve with technological advances and growing demands for sustainability innovation. Grabara et al. (2019) note the need for management's innovation policies to adapt by acquiring new skills, especially with the latest technology. Fernando et al. (2019) argue for leveraging technology to enhance green HR practices, including using digital tools for training and HR systems that support green initiatives (Weng et al., 2015). Song and Yu (2018) propose a green innovation strategy that links green creativity directly with achieving competitive advantages, while Papa et al. (2020) underline the crucial role of HR managers in fostering collaborative innovation and implementing innovative practices.

### **3.3.7. Market demand and competitive pressure**

This determinant was used in four studies. Guerri et al. found that in their research, customer pressure, as part of stakeholder pressure, is associated with all analyzed Green HRM practices, while regulatory pressure is tied explicitly to green hiring. Similarly, Weng et al. (2015) emphasize the influence of customer stakeholder pressures on improving environmental performance. Market differentiation through eco-friendly products and services, attracting environmentally conscious clientele, and fulfilling sustainability criteria stipulated by certain business partners and suppliers (Fernando et al., 2019). The expectations of diverse stakeholders hold considerable sway over an organization's environmental strategies and, consequently, its HR practices (Singh et al., 2020).

### **3.3.8. Corporate social responsibility (CSR)**

This determinant includes the ethical consideration determinants used in two studies. Organizations committed to ethical conduct and social responsibility recognize the significance of environmental stewardship and embed sustainability into their core values and operations, including HRM practices (Weng et al., 2015). This not only aids in attracting and retaining employees who prioritize sustainability but also contributes to positive societal impacts (Yong et al., 2019).

## **3.4. Interrelationship of the green HRM determinants**

### **3.4.1. Green transformational leadership and organizational commitment to sustainability**

Green Transformational Leadership (GTL) plays a significant role in shaping the sustainability commitment of organizations. GTL is a leadership approach that encourages pro-environmental behavior by inspiring employees to integrate sustainability into their roles. Based on Xie and Lau's (2023) research, leaders who exhibit GTL characteristics set a vision for environmental stewardship and create an organizational culture that promotes long-term sustainability goals. They mentioned that:

- Inspiring a sustainability vision: GTL leaders communicate a compelling vision, influencing employees to align their actions with the organization's environmental objectives. This fosters a shared responsibility toward achieving environmental goals.
- Role modelling pro-environmental behavior: These leaders serve as role models by demonstrating environmentally conscious behavior and encouraging employees to emulate these practices, thus strengthening the organizational commitment to sustainability.
- Impact on organizational culture: By embedding green values into the organization's culture, GTL drives the development of sustainable practices across various organizational processes.

### 3.4.2. *The human factor and employee engagement*

The **human factor** refers to the critical role employees play in the success of green initiatives. GTL leaders ensure that employees are not only aware of sustainability goals but are also empowered to actively contribute to achieving them. Research by Faisal (2023) mentioned that:

- Green recruitment and development: Green HRM practices, such as hiring employees committed to sustainability and providing green training programs, are essential to building a workforce capable of implementing environmental strategies.
- Employee engagement: GTL fosters employee engagement by involving employees in sustainability projects and encouraging them to take initiative in green innovation. Employees actively engaged in sustainability feel a deeper connection to the organization's environmental objectives.

### 3.4.3. *Knowledge acquisition and environmental orientation*

Knowledge acquisition and environmental orientation are critical drivers of organizational sustainability. GTL facilitates the organization's acquisition and dissemination of green knowledge, allowing employees to stay updated on the latest environmental practices and technologies. Shahzad et al. (2023) explained the two determinants of Green HRM as follows:

- **Knowledge acquisition:** GTL leaders create an environment where continuous learning is encouraged. This includes staying informed about green innovations, adopting new eco-friendly technologies, and sharing sustainability knowledge across teams. By encouraging innovation, leaders help employees adapt to environmentally conscious processes.
- **Environmental orientation:** GTL ensures that organizational policies and practices are aligned with environmental sustainability objectives. Leaders influence the establishment of green policies that guide the organization toward sustainable operations and decision-making.

### 3.4.4. *Interconnectedness of determinants*

The interplay between GTL, the human factor, knowledge acquisition, and environmental orientation creates a holistic approach to sustainability, as mentioned by Faisal (2023) in his research:

- GTL facilitates environmental orientation by driving the implementation of green goals through HRM practices.
- The human factor is activated through Green HRM policies, ensuring that employees are empowered and skilled to achieve sustainability goals.
- Knowledge acquisition is encouraged through leadership, leading to continuously improving green practices across the organization.

These components reinforce each other, contributing to a strong organizational commitment to sustainability. This elaboration outlines how GTL interacts with key organizational factors to drive sustainability commitments, supported by recent academic sources.

## 3.5. *Sector-specific for the adoption of the determinants of Green HRM*

The manufacturing sector presents unique challenges and opportunities when considering **sector-specific determinants** for adopting Green HRM. Here's an examination of key determinants and how they affect GHRM adoption in this industry.

### 3.5.1. *Regulatory and environmental compliance*

The manufacturing sector is heavily regulated due to its potential environmental impact. Regulatory requirements related to emissions, waste management, and energy efficiency are significant drivers for



Green HRM adoption. As Shahzad et al. (2023) mentioned in their research, companies in this sector are under pressure to comply with environmental laws, which makes integrating green HR practices essential to avoiding penalties and fostering sustainability. **Challenge:** The compliance costs can be high, especially for small and medium-sized enterprises (SMEs) that may lack the resources for large-scale environmental initiatives. **Opportunity:** Adoption of Green HRM practices can lead to **long-term cost savings** through energy efficiency and waste reduction, and it enhances corporate reputation.

### 3.5.2. Green technology and innovation

The manufacturing sector offers vast opportunities for **technological innovation** that supports sustainability. Adopting Green HRM practices facilitates employee training in green technologies, energy management systems, and sustainable production techniques. This focus on knowledge acquisition through Green HRM can lead to **innovative manufacturing processes**, as supported by Faisal (2023). **Challenge:** Training employees on complex green technologies requires substantial investment in both time and financial resources. **Opportunity:** Green HRM provides the framework to foster a **culture of innovation** where employees contribute to the development of greener processes, such as reducing emissions, energy consumption, and material waste.

### 3.5.3. Employee engagement and sustainability culture

GHRM can enhance employee engagement in manufacturing by promoting environmental initiatives such as reducing waste or energy consumption on the shop floor. As Xie and Lau (2023) mentioned in their research, encouraging employees to be involved in sustainability efforts helps create a **sustainability culture** within the organization, which is crucial for sectors that rely heavily on resource-intensive processes. **Challenge:** Resistance to change from employees, particularly in traditional manufacturing environments, where sustainability may not have been a focus. **Opportunity:** With proper leadership and training, Green HRM can cultivate **pro-environmental behavior** among employees, fostering ownership of sustainability goals.

### 3.5.4. Supply chain pressures and sustainability Integration

Manufacturers are often part of complex global supply chains, and there is growing pressure from stakeholders (including consumers and business partners) to adopt **sustainable practices**. In their research, Shahzad et al. (2023) mentioned that Green HRM could play a critical role by integrating sustainability across the supply chain, from sourcing raw materials to final production. **Challenge:** The complexity of implementing green practices across global supply chains, especially in regions with less stringent environmental regulations. **Opportunity:** Companies that successfully adopt GHRM can gain a **competitive advantage** by meeting the sustainability standards required by international partners and consumers, thus improving their market position.

We can conclude that in the manufacturing sector, GHRM faces unique challenges, such as compliance costs, the need for technological adaptation, and the difficulty of engaging employees in sustainability initiatives. However, it also presents vast opportunities for innovation, cost savings, and enhanced market competitiveness. Manufacturing firms can achieve environmental and organizational sustainability by addressing these sector-specific determinants.

## 3.6. Integration of past and present understanding of Green HRM

This section highlights how the early work shaped the integration of HR practices with environmental management, forming the base for modern Green HRM. Renwick et al. (2013) and Daily and Huang (2001) will examine two early studies.

Renwick et al. (2013) provided a framework that examined how traditional HR practices could align with environmental goals to foster organizational sustainability. Key insights include 1) **Link between HR practices and environmental outcomes:** The authors demonstrated how HR functions like recruitment, training, performance management, and rewards could be adapted to support environmental



management. For example, they suggested recruiting environmentally conscious employees and providing training on sustainability practices. 2) **Environmental behaviors and organizational sustainability:** The paper emphasized that HR managers are critical in encouraging pro-environmental employee behaviors. This involves embedding environmental responsibilities into job descriptions, promoting green employee engagement, and rewarding green behaviors. 3) **Call for future research:** The paper served as a foundation for future studies by identifying the need for more research on how HRM can effectively support environmental management practices.

Daily and Huang (2001) were among the first to identify the importance of human resource factors in implementing environmental management systems (EMS). Their insights include: 1) **HR's role in Environmental Management Systems (EMS):** They argued that the success of EMS depends heavily on the involvement of HR in providing appropriate training, encouraging employee involvement, and supporting leadership for environmental goals. 2) **Training and development for sustainability:** Daily and Huang (2001) suggested that providing employees with the skills and knowledge to participate in environmental initiatives is crucial for organizations seeking to improve their sustainability performance. This aligns with the focus on Green HRM practices today, where training on environmental issues is considered a key component of a sustainable organization. 3) **Employee participation and commitment:** The authors stressed that encouraging employee involvement in environmental initiatives can foster a more substantial commitment to sustainability. They highlighted how leadership support and employee engagement are essential for achieving long-term environmental goals.

Both papers laid the groundwork for the **modern understanding of Green HRM**, which integrates HR practices with environmental objectives to achieve sustainability: 1) **From foundational theory to current practice:** The foundational insights from Renwick et al. (2013) and Daily and Huang (2001) have been expanded upon in recent research to explore more detailed mechanisms through which HR practices can influence sustainability. Modern studies build on their work by focusing on implementing **green policies** at various organizational levels and across different sectors. 2) **Emphasis on employee engagement and training:** These early studies emphasized employee engagement and the role of HR in facilitating pro-environmental behaviors. Today, Green HRM continues to focus on these aspects, particularly the **training and development of green skills** and the fostering of a culture of sustainability throughout the organization. 3) **Link to sustainability performance:** Both papers highlighted the direct connection between HR practices and sustainability outcomes. Recent literature further validates this connection by demonstrating the **positive impact** of Green HRM on organizational sustainability performance, green innovation, and competitive advantage.

## 4. Conclusion and recommendation

### 4.1. Conclusion

This study employs a Systematic Literature Review methodology. Twenty-six articles were selected based on predefined criteria to investigate the greening of the workforce through the determinants of Green HRM practice. The primary factor of Green HRM is incorporating environmental management objectives into the organization's HR policies, practices, and strategies to encourage sustainable resource utilization and environmentally friendly behaviors among employees. The critical determinants examined in this study encompass green transformational leadership, the human element, organizational commitment to sustainability, knowledge acquisition, environmental orientation, pressure for green innovation, market demand and competitive pressures, and Corporate Social Responsibility (CSR).

Despite none of the 26 reviewed articles addressing industrial relations in the Green HRM context, these relations are crucial for successful Green HRM implementation. Firstly, effective industrial relations contribute to a positive work environment and increase employee engagement and commitment towards green. They also provide conflict resolution mechanisms essential when introducing new green policies (Katz et al., 2018). Additionally, they help balance management and employee interests during significant changes toward sustainability. Industrial relations also ensure compliance with legal and environmental regulations, which is vital for effective Green HRM (Huang et al., 2017), and promote open communication and employee involvement in decision-making, enhancing support for green initiatives (Kaufman &

Levine, 2016). Overall, industrial relations are crucial to fostering a supportive and collaborative environment that promotes environmentally sustainable behavior in the workforce.

## 4.2. Recommendation

This literature review highlights the untested nature of its findings on Green HRM, noting variability across different companies and locations. It also suggests more in-depth Systematic Literature Reviews combined with bibliometrics for better validation. While focusing broadly on the impacts of Green HRM, the study does not address the influence of industrial relations. Still, it introduces a theoretical model based on literature and emphasizes Green HRM's role in achieving sustainable organizational performance. Future research should consider the cultural, ethical, and logistical challenges of implementing Green HRM and the implications of greening the workforce in various business contexts, including the impact of industrial relations.

## 5. Practical implications and role of unions

### 5.1. Based on the results of this study, here are some practical implications that we can draw

1. Organizational strategy and policy development. a) Integration of Green HRM into Strategic Planning: Organizations must embed Green HRM practices into their strategic plans to ensure alignment with sustainability goals. This involves setting clear environmental objectives and integrating them into HR policies and practices. b) Training and Development: Training programs to educate employees about sustainability and green practices can enhance their engagement and commitment to Green HRM initiatives.
2. Leadership and management. a) Green Transformational Leadership: Leaders should adopt transformational leadership styles emphasizing environmental stewardship. This includes inspiring employees through a sustainability vision and leading by example in green practices. b) Employee Involvement and Engagement: Encouraging active employee participation in sustainability initiatives can foster a culture of environmental responsibility. Engagement can be enhanced through regular communication, feedback mechanisms, and recognition of green efforts.
3. Operational practices. a) Sustainable Recruitment and Selection: Incorporating sustainability criteria into recruitment processes can attract candidates committed to environmental values, strengthening the organization's green culture. b) Performance Management: Integrating sustainability metrics into performance appraisals can motivate employees to adopt and excel in green practices. This can be achieved by setting specific, measurable, achievable, relevant, and time-bound (SMART) sustainability goals.
4. Corporate social responsibility (CSR) and Market Demand. a) CSR Initiatives: Developing and promoting CSR initiatives focusing on environmental sustainability can enhance the organization's reputation and competitiveness in the market. b) Market Responsiveness: Organizations should stay attuned to market demands for green products and services, adjusting their HRM practices to support the development and delivery of sustainable offerings.
5. Industrial relation to Green HRM. a) Collaboration with Labor Union: Establishing solid partnerships with labor unions can facilitate the implementation of Green HRM practices. Unions can be pivotal in negotiating green initiatives, promoting worker involvement, and ensuring sustainability goals align with employees' rights and interests. b) Employee Engagement and Participation: Encouraging employee involvement in environmental decision-making processes can enhance the effectiveness of Green HRM activities. This can be achieved through joint committees, regular consultations, and transparent communication channels. c) Conflict Resolution Mechanisms: Developing effective conflict resolution mechanisms can address potential disputes arising from implementing Green HRM practices. This ensures that changes are made smoothly and that employees' concerns are adequately addressed. d) Fair Labor Practices and Sustainability: Ensuring that green initiatives do not compromise fair labor practices is crucial. Organizations should balance environmental goals with fair wages, safe working conditions, and job security.

## 5.2. Unions, collective bargaining, and employee relations in building a Green HRM

This section briefly explores unions, collective bargaining, employee relations in building a green HRM, and successes and challenges in unionized settings.

**Unions and collective bargaining** play a critical role in shaping the success of Green HRM, particularly in unionized settings where employee engagement and worker rights are central. Unions can be both enablers and obstacles to building a green workforce, depending on the nature of the industry and the perceived impact of green initiatives on worker welfare. Unions have historically advocated for worker rights, and in recent years, they have expanded their focus to include **environmental goals** within collective bargaining agreements (CBAs). For example, unions in the **energy and manufacturing sectors** have successfully negotiated for **green skills training** to help workers adapt to new environmental standards and technologies (Shahzad et al., 2023; Xie & Lau, 2023). By integrating **green clauses** into CBAs, unions help ensure that employees are well-equipped to participate in organizational sustainability efforts while also safeguarding their jobs and working conditions.

In some industries, unions have successfully pushed for the creation of **green jobs**, such as roles dedicated to overseeing sustainability initiatives. This is particularly evident in industries like renewable energy, where unions have negotiated positions like 'sustainability officers' or 'green energy managers' (Faisal, 2023). These roles help organizations meet their environmental objectives and create new opportunities for workers.

However, the **relationship between unions and green initiatives** has challenges. In carbon-intensive industries such as **coal, oil, and gas**, unions often perceive environmental policies as threats to job security. This resistance can slow the adoption of green practices, as unions may fear initiatives focused on reducing emissions or transitioning to renewable energy will lead to job losses (Xie & Lau, 2023). For instance, in the mining sector, unions have resisted green policies that would lead to downsizing, even when such policies are designed to create long-term sustainability. These concerns highlight the need for a **balanced approach** where green workforce development is implemented to align with job security and economic goals (Shahzad et al., 2023).

**Collective bargaining** also provides a platform for integrating **environmental health and safety standards** into workplace policies. For example, unions in heavy industries have negotiated for **environmentally friendly safety standards** to protect workers from hazardous materials while promoting sustainable production methods. These efforts demonstrate the potential for unions to play a constructive role in driving **green workforce development** when there is an alignment between environmental goals and worker welfare.

In unionized settings, **employee relations** are often enhanced through the formation of **joint sustainability committees**, where unions and management collaborate on green initiatives. These committees have been successful in industries like construction and energy, where worker involvement in sustainability projects is crucial for the effective implementation of environmental policies (Faisal, 2023).

By ensuring that employees have a voice in sustainability planning and execution, unions help foster a **sustainability culture** within the organization. This engagement improves worker morale and strengthens the organization's overall commitment to environmental objectives.

Despite these successes, unions face challenges in **negotiating green standards** with management. Agreeing on what constitutes fair and practical green policies can be complex, especially when it involves significant investment in new technologies or changes in work practices. Furthermore, unions in industries facing economic difficulties may prioritize wage increases and job security over environmental goals, complicating the negotiation of green practices.

**Conclusion.** The role of **unions, collective bargaining, and employee relations** in building a green workforce is multifaceted. While unions can act as strong advocates for sustainability by incorporating green clauses into CBAs and promoting worker engagement in environmental initiatives, they also face challenges, particularly in industries where green policies may threaten job security. By understanding these dynamics, organizations can develop strategies that balance the **economic needs of workers** with the **demands of environmental sustainability**, ensuring that unions and management work together to create a more sustainable future.

## 6. Future research agenda

The structure of the future research agenda is arranged with a focus on technological innovation, employee involvement, and industrial relations while addressing the gaps in Green HRM literature, as follows:

1. Technological Innovation and Green HRM. The integration of technological advancements with Green HRM has the potential to revolutionize how organizations approach sustainability. Research in this area should prioritize:

- The Role of Digital Tools in Green HRM: Examine how technologies like AI, HR analytics, and automation impact the implementation of Green HRM practices. This could involve assessing how digital platforms facilitate sustainability training, recruitment, and performance management in ways that reduce environmental footprints.
- Green HRM and Remote Work: Investigate the impact of remote work technologies on sustainability, particularly in reducing carbon emissions through telecommuting and virtual collaboration.

Current Gaps: Limited studies have explored the full impact of digital transformation on Green HRM practices. Further research is needed to understand how HR technology can optimize environmental outcomes and employee engagement (Shahzad et al., 2023; Xie & Lau, 2023).

2. Employee engagement and the human factor in Green HRM. Employee involvement is critical for the success of Green HRM. Future research should focus on:

- Employee perception and participation: Investigate how employees' attitudes and perceptions influence the success of Green HRM initiatives. This research could include examining generational or demographic differences in support of sustainability.
- Green HRM and Employee behavior: Study how Green HRM policies affect workplace behaviors, such as energy conservation, waste reduction, and engagement in corporate social responsibility (CSR) activities.

Current Gaps: More studies are needed to understand the long-term behavioral impacts of Green HRM and to explore the factors that foster active employee participation (Faisal, 2023; Xie & Lau, 2023).

3. Industrial relations and collective bargaining. The role of unions and industrial relations frameworks is vital in shaping Green HRM practices, particularly in unionized sectors. Research could focus on:

- Union Involvement in Sustainability: Examine how unions can contribute to designing and implementing Green HRM policies through collective bargaining agreements (CBAs) that include environmental clauses.
- The Mediating Role of Industrial Relations: Investigate how industrial relations can mediate the success of Green HRM by balancing sustainability goals with employee rights and job security.

Current Gaps: There is a lack of research on the intersection of industrial relations and Green HRM, especially in how labor unions contribute to or challenge green workforce initiatives (Shahzad et al., 2023; Xie & Lau, 2023).

4. Alignment with sustainable development goals (SDGs). Another promising research area is the alignment of Green HRM with the United Nations SDGs. Research could focus on:

- Green HRM's contribution to SDGs: Explore how Green HRM can support SDG 8 (Decent Work and Economic Growth) and SDG 13 (Climate Action), examining case studies where HR practices have successfully aligned with these goals.

Current Gaps: More empirical studies are needed to track how Green HRM can directly support SDG objectives and measure the long-term organizational impact (Xie & Lau, 2023).

5. Sector-specific and context-specific research. Given the diversity of industries and regions, sector-specific studies can offer deeper insights into how Green HRM is applied in different contexts.

- Industry-specific studies: Research should examine industries with high environmental impacts, such as manufacturing, energy, and construction, to assess how sector-specific challenges influence Green HRM adoption.
- Regional factors in green HRM: Contextual factors, such as regulatory environments and economic development levels, can affect the effectiveness of Green HRM practices. Studies focusing on developing economies or different regulatory frameworks can highlight the diversity in Green HRM adoption.

Current Gaps: Few studies have explored how contextual factors—such as industry type, region, or regulatory environment—affect the success of Green HRM initiatives (Faisal, 2023).

**Conclusion.** The research agenda focuses on areas representing significant gaps in current Green HRM literature while grouping related areas such as technology and innovation, employee involvement, and industrial relations. Future studies can provide deeper insights into how Green HRM can contribute to organizational and environmental sustainability by addressing these gaps and prioritizing research based on their potential impact. By focusing on these practical implications and future research directions, organizations can better integrate Green HRM practices into their operations and contribute to a more sustainable future. Future research will provide deeper insights and evidence-based strategies to support these efforts.

### Authors' contributions

Conceptualization: Bimo and Sulistyaningsih; methodology & software: Sulistyaningsih; validation: Bimo; formal analysis & investigation: Bimo & Sulistyaningsih; resources & data curation: Sulistyaningsih; writing—original draft preparation: Bimo & Sulistyaningsih; writing—review and editing: Bimo; visualization: Sulistyaningsih; supervision: Bimo. Both authors have read and agreed to the published version of the manuscript.

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### Data availability statement

The data for this research and its findings were derived from the resources available in the public domain: Crossref and Google Scholar databases.



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