

Sustainable HRM in the Green Economy: Challenges and Opportunities for Workforce Development

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Green Human Resource Management (GHRM) represents a developing academic field which applies sustainability guidelines to human resource management approaches resulting in environmental practices within workforce development. An evaluation studies the fundamental concepts along with business sector adaptation and implementation challenges of Green HRM as well as its projected trajectory toward sustaining corporate performance and building a better workforce. The study incorporates research from 2020 to 2024 through systematic review methods to evaluate Green HRM practices starting with green recruitment followed by sustainability training and performance management and finishing with eco-incentives. The manufacturing sector together with hospitality lead the way in adopting GHRM but finance and banking lag behind because of reduced regulatory requirements. Green HRM implementation encounters several obstacles which include expensive deployment costs and non-uniform policies and employee reluctance and technological limitations. Research needs to develop insights about AI in human resource management and sustainably implement cross-cultural sustainability measures and their lasting effects on labor forces. Digital HR technologies combined with both big data evaluation and regulatory systems will lead to faster Green HRM adaptations by businesses. Sustainability-based human resources policies need adoption from organizations to drive improved workforce participation as well as organizational market strength and environmental outcomes. This review confirms that Green HRM enables the creation of sustainable future-focused workforces which support worldwide sustainability requirements and builds extended economic and environmental stability.

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1. Introduction

The quick transition to a green economic model has led organizations worldwide to restart their human resource management (HRM) practices through workforce development by incorporating sustainability-focused strategies. Companies now adopt sustainable models because climate change concerns and resource shortages and environmental deterioration have become critical issues that push businesses to establish CSR initiatives and environmental governance standards (Bimo & Sulistyaningsih, 2024). Green HRM functions as a vital business transformation element by introducing sustainability-based policies to recruitment selection and training and employee engagement and performance management according to Miah, Szabó-Szentgróti, & Walter (2024). Strategic planning which integrates Green Human Resource Management produces superior environmental and social results while simultaneously strengthening employee performance and building positive brand identity (Obeng, Arhinful, Mensah, & Osei, 2024).

Through Green HRM organizations create ready-for-tomorrow staff who demonstrate excellence in sustainability practices. Businesses recognize the importance of employee retraining for sustainability-based business models and this advantage specifically helps industries requiring resource-efficient manufacturing and sustainable energy system development (Huang, Law, & Ouyang, 2024). Organizations that adopt sustainability-based HRM policies build stronger connections with their staff and boost worker satisfaction which leads to improved business performance since employees perceive sustainability work as meaningful (Nisar et al., 2021). The implementation of Green HRM differs between industries because organizations struggle to adopt this approach due to budget constraints and regulatory standards and employee resistance to change (Lo Presti, Van der Heijden, & De Rosa, 2024).

Larger corporate entities along with multinational companies (MNCs) show higher levels of Green HRM policy implementation than small and medium-sized enterprises (SMEs) because of resource constraints and budget limitations (Doghan, 2024). The pursuit of environmental responsibility by developing economies faces ongoing economic obstacles while they implement workforce sustainability initiatives established by developed economies (Odozi, 2024; Qiu & Zhou, 2024). Companies use AI-driven HR analytics combined with digital workforce transformation and blockchain-based employee sustainability tracking to

enhance Green HRM efficiency because of the economic gap between developed and developing economies (Budhwar, Malik, De Silva, & Thevisuthan, 2022).

This analysis investigates Green HRM practices across industries and their adoption challenges as well as future business opportunities because Green HRM provides essential benefits for labor sustainability and corporate performance. A detailed examination studies particular industrial sectors by evaluating both employee perspectives and customer needs with human resource management practices that develop sustainable workforce frameworks. This study uses bibliometric analysis and comparative studies and SWOT analysis and gap analysis to conduct both quantitative and qualitative assessments of Green Human Resource Management research development. The review analyzes existing research to recognize study deficiencies while creating policy solutions which enhance Green HRM performance for sustainable workforce challenges in the green economy (Rashid, Ghani, Khan, & Usman, 2023).

2. Methodology: A Systematic Review Approach

The analysis examined how Green HRM supports workforce development by reviewing literature about the green economy. The review adopts PRISMA 2020 guidelines to standardize its literature screening methods and synthesis steps as well as identification procedures (Page et al., 2021). The research analysis focuses on publications spanning from 2020 to 2024 to demonstrate modern developments and trends in Green HRM. The research adopted systematic methodology starting from goal definition and included literature survey and requirements screening and thematic grouping of chosen studies and qualitative synthesis application to generate synthesized findings. The research used a predetermined filtering system with an analytical method that combined bibliometric analysis with comparative analysis and SWOT analysis and research gap detection to select high-quality relevant literature.

2.1 Data Sources and Search Strategy

To guarantee a comprehensive search in peer-reviewed literature pertaining to Green HRM, sustainability and workforce development, a structured search was conducted in Scopus, Web of Science (WoS), Google Scholar, ScienceDirect, EMerald Insight and SpringerLink. The search process was a keyword based strategy using Boolean

operators to refine and retrieve relevant studies. Several key search terms relating to “Green HRM” and a “sustainable workforce”: Sustainable HRM and Employee engagement; Workforce development and environmental sustainability; Green talent management and corporate societal responsibility (CSR); HRM in the green economy or sustainability driven HRM.

Of the 268 studies, 268 studies were retrieved initially; these studies were filtered out of the analysis using a stepwise screening process to bring out relevant research. After removing 54 duplicate studies, 214 articles remained and were assessed by abstract screening. After rigorously assessing eligibility, 25 total of 125 studies were included in the final review. To ensure best practices in systematic reviews, the PRISMA framework was used for the selection process.

2.2 Inclusion and Exclusion Criteria

The selection criteria used in the study were established criteria for ensuring research quality. The research focus was on empirical, conceptual and systematic review papers on Green HRM and workforce development and sustainability driven HR strategies that appeared in peer reviewed journals between 2020 and 2024 (Kloutsiniotis et al., 2022).

The primary focus of credibility was on all research material coming from high impact journals listed in Scopus, Web of Science and SCI. Studies that focused on workforce sustainability as well as HRM and both grey literature and unreviewed articles and book chapters with conference abstracts were excluded from the review. When those studies were acknowledged as pioneering works in their field, the research only accepted older publications from 2020 and earlier.

2.3 Literature Selection Process

The PRISMA (2020) framework was used to create a systematic and reproducible selection process as per Page et al. (2021). The research began with the identification phase which was to collect literature from academic databases. Duplicate study removal and abstract assessment were performed to determine study suitability, and evaluation began. Methodological and findings analysis, as well as research objectives validation, was conducted by the researchers through a full text study eligibility assessment. Inclusion criteria were implemented to finalize selection of qualitative research materials and 85 studies were chosen. A PRISMA flowchart was used to represent the selection process in the figure 1.

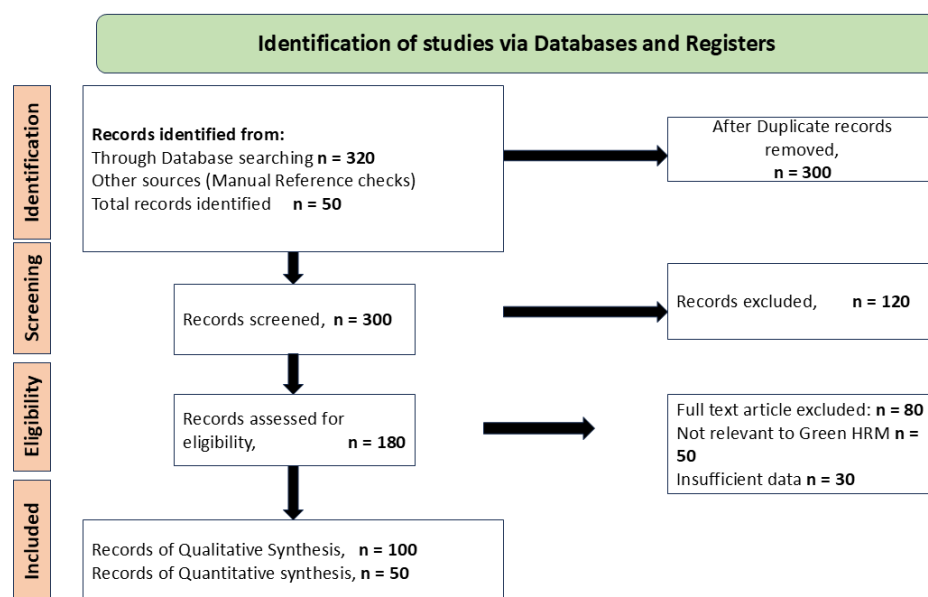


Figure 1: PRISMA Flowchart for Systematic Literature Review

This study on Green HRM follows a systematic review process, which is illustrated in the PRISMA Flow Diagram. A total of 320 records were identified by searching the database followed by another 50 from other sources. After removing duplicates, 300 records were left for screening. Of the 120 records

excluded during the screening phase, 180 full text articles were assessed for eligibility, of which 80 were excluded for insufficient data or lack of relevance to Green HRM. Finally, 50 studies participated in the quantitative synthesis (meta-analysis) and 100 studies in the qualitative synthesis to allow for a complete

review.

2.4 Thematic Classification and Data Extraction

The researched papers were categorized into five primary research themes using a thematic analysis system for orderly synthesis of conclusions. The first research theme that users can find in Bimo and Sulistyaningsih (2024) is how organizations utilize Green HRM Practices in their recruitment methods, training initiatives, performance evaluation and incentive systems. The second research theme focuses on industrial variations between manufacturing, IT, energy and hospitality sectors (Doghan, 2024), which is based on green HRM implementation in different sectors. The third theme (Obeng et al., 2024) is Workforce and Organizational Performance which is strengthened through Green HRM assessment. According to Lo Presti et al. (2024), there are barriers for the successful implementation of Green HRM, which include financial limitations, regulatory gaps, and organizational resistance. According to Budhwar et al. (2024), AI, digital HR transformation and policy interventions will influence the upcoming phase of Green HRM.

The researchers structured the chosen studies through a coding framework to extract comparable findings. The systematic data interpretation method resulted in consistency in research analysis and a thorough combined study of available literature and further areas to be researched in future.

2.5 Analytical Techniques Used

To ensure a comprehensive and multi-faceted review, this study applied the following analytical techniques:

- **Bibliometric Analysis:** Examined publication trends, citation networks, and keyword co-occurrences to identify research clusters and influential studies (Huang, Law, & Ouyang, 2024).
- **Comparative Analysis:** Evaluated differences in Green HRM adoption across industries and geographical regions (Doghan, 2024).
- **SWOT Analysis:** Identified strengths, weaknesses, opportunities, and threats in Green HRM implementation (Odozi, 2024).
- **Gap Analysis:** Highlighted underexplored research areas and provided recommendations for future Green HRM studies (Rashid et al.,

2023).

These analytical techniques are used to ensure that the findings presented in this review contribute to advancing the academic and practical understanding of Green HRM, grounding them in data-driven insights.

3. Conceptual Foundations of Green HRM in the Green Economy

Human Resource Management (HRM) has therefore taken up a shift to a green economy and need to integrate principles of sustainability. Green HRM (GHRM) strategies have been a common organizational practice to bridge human resources management operations to environmental sustainability objectives. Green HRM is the core focus of enabling employees to become environmentally responsible and reducing company carbon emissions and achieving better sustainability results (Bimo & Sulistyaningsih, 2024). Three main reasons are given by Huang, Law, and Ouyang (2024) for the shift of modern business operations to Green HRM: regulatory compliance demands, competitive market forces, and the increasing value of corporate social responsibility (CSR).

Several theoretical perspectives underpin the development and implementation of Green HRM. According to AMO framework and Stakeholder Theory combined with Resource Based View (RBV), employee engagement in sustainability initiatives is explained by AMO framework and Stakeholder Theory combined with Resource Based View (RBV) as to why Green HRM is important for long term workforce sustainability (Priksht et al., 2023). Green human resources management field has been expanded through AI driven HRM systems, digital workforce transformations and green leadership models that have led to Green HRM becoming an important organizational success factor in the green economy (Budhwar et al., 2024).

3.1 Theoretical Models Supporting Green HRM

Green HRM bases on the verified theoretical frameworks to show how HRM practices give opportunity to the workforce to participate in sustainability initiatives. These models provide HRM practitioners with a systematic way of making their contribution towards sustainable business operations.

Table 1: Theoretical Models of Green HRM and Their Contributions

Theoretical Model	Key Concepts	Application in Green HRM	References
Ability-Motivation-Opportunity (AMO) Framework	Employees engage in sustainability initiatives when they have the skills, motivation, and opportunity to do so.	HR practices such as green training, sustainability-linked performance management, and eco-incentives help employees adopt green behaviors.	Bos-Nehles et al. (2023)
Stakeholder Theory	Organizations must balance the interests of multiple stakeholders (employees, investors, regulators, customers).	Green HRM strategies help firms meet CSR goals, regulatory requirements, and employee expectations for sustainability.	Obeng et al. (2024)
Resource-Based View (RBV)	Sustainable HRM policies contribute to competitive advantage by developing workforce capabilities in green practices.	Investing in green talent management, leadership development, and workforce sustainability ensures long-term organizational success.	Lo Presti et al. (2024)

These models present distinctive concepts about integrating Green HRM strategies into organizational structures. Each model within the research has distinct features about employee development and company social responsibility and sustainable resource investment strategies.

3.2 Conceptual Model of Green HRM and Workforce Sustainability

Green HRM practices create sustainable worker populations while improving companies' results in environmental performance. Figure 2 shows the Green HRM Sustainability Model which explains how Green HRM practices create relationships between employee engagement and corporate sustainability and workforce development.

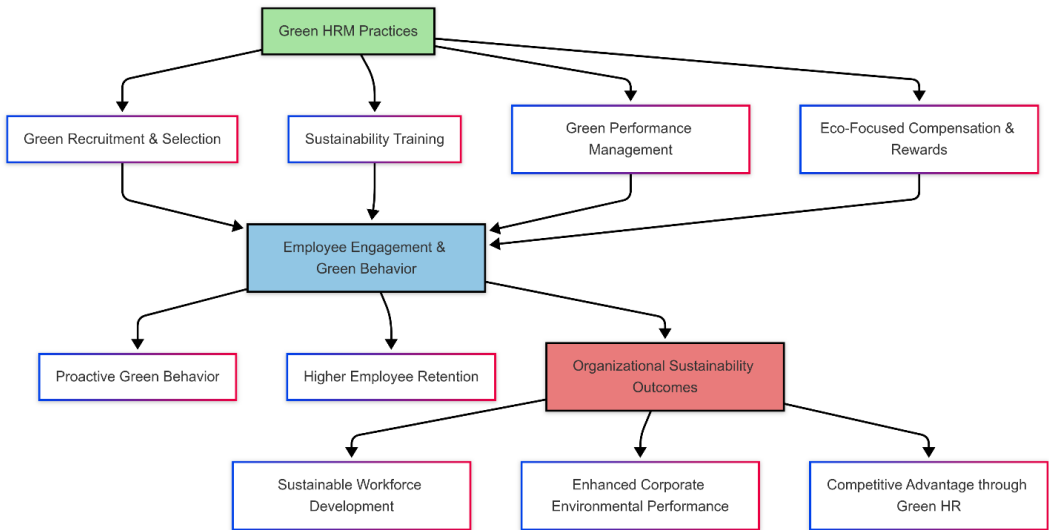


Figure 2: Conceptual Model of Green HRM and Workforce Sustainability

Green HRM Practices →	Employee Engagement & Green Behavior →	Organizational Sustainability Outcomes
Green Recruitment & Selection	Increased Environmental Awareness	Sustainable Workforce Development
Sustainability-	Proactive Green Behavior	Enhanced Corporate

Focused Training		Environmental Performance
Green Performance Management	Higher Employee Retention	Long-Term Business Sustainability
Eco-Focused Compensation & Rewards	Motivation for Sustainable Actions	Competitive Advantage through Green HR Practices

The conceptual framework illustrates how HRM interventions guide employee conduct which creates effects on workforce sustainability together with corporate environmental strategies. Organizations that include structured Green HRM policies in their operations build sustainability-focused employees who produce quantifiable environmental and economic results.

3.3 Emerging Trends in Green HRM

With the development of Green HRM, new trends are emerging for its implementation in different sectors. HRM strategies for the development of the workforce are undergoing redefinition by the rise of artificial intelligence (AI), the digital workforce transformational and policy driven sustainability mandates.

3.3.1 AI-Driven Green HRM and Workforce Automation

Organisations are now able to monitor employee eco behaviour via AI powered HR analytics, machine learning models and digital sustainability reporting system to improve sustainability performance and optimize HR process for environmental efficiency (Budhwar et al., 2024). Green recruitment tools powered by AI help HR people find competent

candidates in terms of sustainability, so that businesses are not hiring exclusively without matching their green goals.

3.3.2 Digital Transformation and Sustainability-Oriented HRM

Cloud based HR systems, remote work solutions and virtual sustainability training programs adoption are leading to paperless HR operations, better energy consumption and better way of working together for HR sustainability initiatives (Huang et al., 2024). To track these parameters, companies are now utilising AI driven HR dashboards which use their carbon footprints, their workforce energy consumption and their compliance with their sustainability metrics.

3.3.3 Policy-Driven Sustainability and Regulatory Compliance

However, governments are mandating carbon neutrality, sustainability regulations, and eco labor laws in order to induce adoption of Green HRM across all industries (Doghan, 2024). More and more, organizations are compliance with standards such as ISO 14001 environmental management systems, corporate sustainability reporting frameworks, green labour laws, prompting them to make a commitment towards integrating sustainability focused HRM policies, which have become a key driver for this increasingly important practice.

Table 2: Emerging Trends in Green HRM

Trend	Description	Impact on Green HRM	References
AI-Driven Green HRM	AI-based HR analytics optimize sustainability strategies and green talent management.	Enables automated monitoring of eco-friendly behaviors and green KPIs.	Budhwar et al. (2024)
Digital Workforce Management	Use of cloud-based HR systems to manage sustainability initiatives.	Reduces energy consumption and promotes paperless HR practices.	Huang et al. (2024)
Regulatory Compliance & Sustainability Laws	Governments enforce carbon neutrality and CSR-related policies for organizations.	Companies must adopt structured Green HRM policies to meet legal requirements.	Doghan (2024)

Such emerging trends suggest that green HRM and sustainable workforce management will be determined, ever more, by technological innovation, digital transformation and policy intervention.

Green HRM is founded on well developed theoretical models of Stakeholder theory, AMO, and Resource Based view (RBV). These models provide an explanation of the role of HRM in driving workforce sustainability, employee engagement, and corporate environmental responsibility. This paper demonstrates how structured HR policies can contribute to long term green benefits through green behaviors in the Green HRM Sustainability Model. As the green economy emerges and progresses, the need of adopting Green HRM strategies proactively by organizations to complete with today’s green economy has come to be necessary.

4. Bibliometric Analysis: Trends and Evolution of Green HRM Research

Bibliometric analysis is a widely used method in analyzing research trends, citation patterns and knowledge distribution in the same field. Bibliometric analysis plays in the perspective of Green HRM can help to gauge the pattern of publications growth, determine the most influential research work, and the key research themes that are driven up to date. The years have seen the growing industry interest in Green HRM from the point of side of environment responsibility, workforce management and sustainability.

4.1 Trends in Green HRM Research Publications and Citations

In the past four years, the volume of research publications in Green HRM has grown steadily, which indicates an increased interest in the adoption of HR practices related to sustainability. Figure 3 displays the annual trend of Green HRM publications from 2020 to 2024, which indicates an upward trend in the number of research articles published from 2020 to 2024.

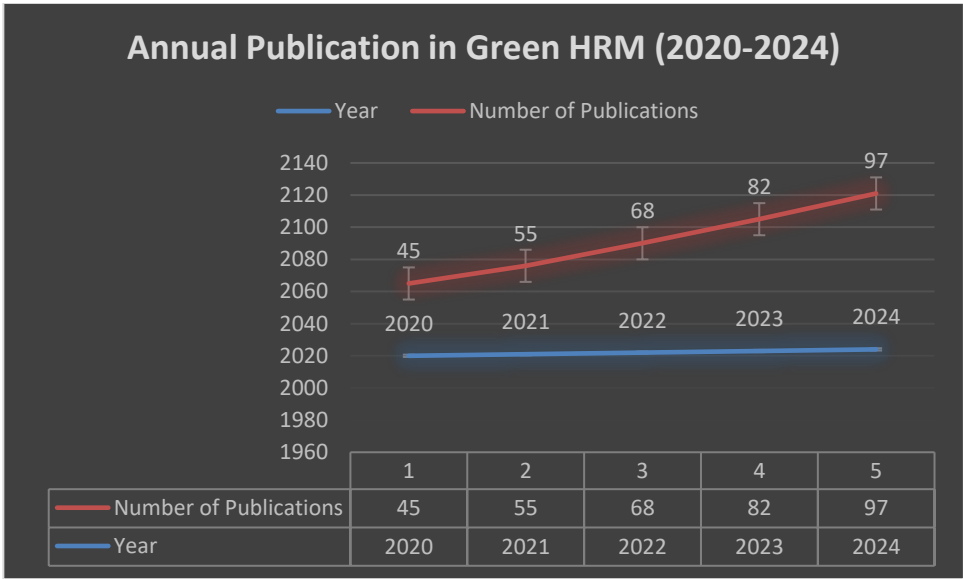


Figure 3: Annual Publications in Green HRM (847-865)

Green HRM has seen increased number of publications from 45 in 2020 to as high as 97 in 2024 which indicates the increase awareness of implementing sustainable HRM strategies across all industries. The implication of this trend is that Green HRM is becoming a crucial research field in HRM and sustainability studies.

Figure 4 also shows the annual citation count of Green HRM research over time, as well as, in addition, the publication counts of this stream. Green HrM literature has been receiving greater influence and academic recognition in 2024 compared to 250 in 2020 with citation count having risen from 250 to 690 in 2024.

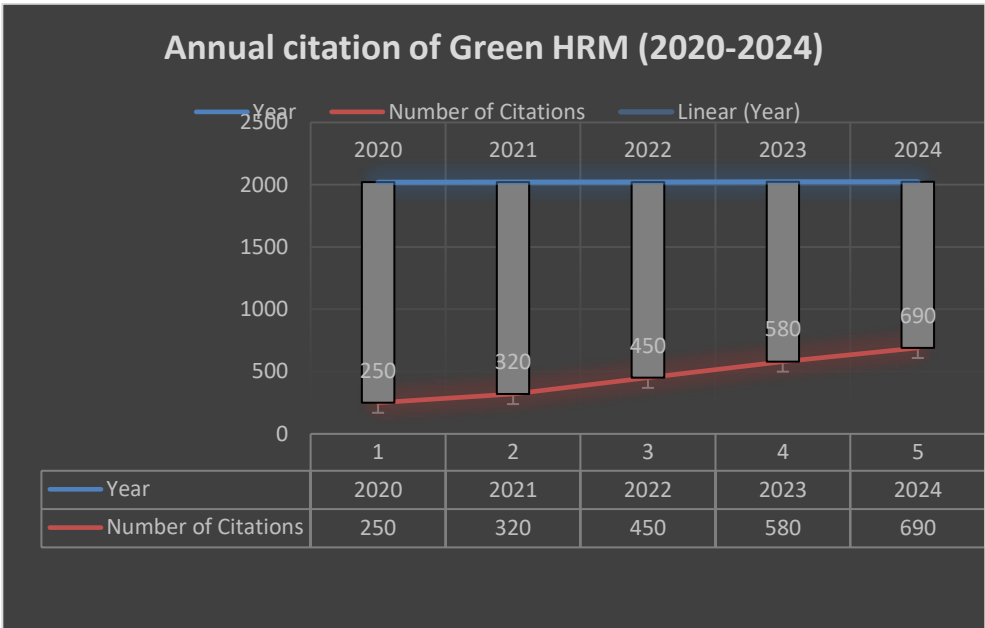


Figure 4: Annual Citations of Green HRM Research (847-865)

The increase in citations indicates that Green HRM research is gaining traction in both academic and industry discussions, with more scholars and practitioners referencing sustainability-driven HRM strategies in their work.

A thematic analysis of recent Green HRM research reveals several emerging themes and research clusters. Table 3 provides an overview of the most dominant themes in Green HRM publications from 2020 to 2024.

4.2 Key Research Themes in Green HRM

Table 3: Key Research Themes in Green HRM (847-865)

Theme	Key Focus Areas	Research Significance
Green Recruitment & Selection	Sustainable hiring practices, green employer branding	Workforce alignment with sustainability goals
Sustainability Training & Development	Employee education on environmental practices	Enhances green competencies & innovation
Green Performance Management	Eco-friendly performance evaluation metrics	Strengthens accountability & sustainability culture
Green Compensation & Rewards	Financial and non-financial incentives for green behavior	Encourages eco-friendly employee behavior
Impact on Employee Engagement	Motivation and job satisfaction in sustainability-driven firms	Enhances workforce commitment & productivity
Sector-Wise Implementation	Comparative studies across industries	Identifies industry-specific Green HRM challenges
AI & Digital HRM for Sustainability	AI-driven HR analytics, automation of sustainability reporting	Improves efficiency in managing sustainability initiatives

These themes indicate that Green HRM research has expanded beyond theoretical discussions to focus on practical applications in workforce sustainability,

performance evaluation, and employee engagement.

4.3 Most Cited Authors and Influential Research

in Green HRM

A bibliometric analysis of the most cited works in Green HRM helps identify key contributors and

foundational studies in the field. Table 4 presents the top-cited research papers in Green HRM between 2020 and 2024.

Table 4: Most Cited Research Papers in Green HRM (847-865)

Author(s)	Title	Year	Citations
Budhwar et al.	AI-augmented HRM: Challenges and opportunities for international workforce management	2024	198
Doghan	Green HRM practices, green capability, and green performance	2024	175
Huang et al.	Sustainable HRM and corporate environmental performance	2023	150
Obeng et al.	Employee engagement in Green HRM: A case study approach	2023	142
Bimo & Sulistyaningsih	Greening the workforce: A systematic literature review of Green HRM determinants	2024	135

Making these studies has hugely contributed to the development of Green HRM theories and practice, especially knowledge on AI driven HR sustainability, employee engagement and the environmental metrics.

The bibliometric analysis of Green HRM research between 2020 and 2024 reveals a great surge in publications and citations indicating increasing appetite of the academic and industry in sustainable HRM. Research themes are illustrated, the most cited papers and the current dynamics of Green HRM publications are presented in the analysis. Despite this progress, future research can focus on AI as a means for HRM, long term sustainability impact assessment, and cross cultural variance for Green HRM adoption.

5. Green HRM Practices and Their Impact on Workforce Development

Green Human Resource Management (GHRM) is considered to be an important tool for workforce development by merging the sustainability principles into HR functions like recruitment, training, employee engagement and performance management (Kaushal et al, 2023). Green HRM strategies are adopted by organizations and they have higher employee commitment, higher job satisfaction, and better environmental performance (Huang, Law, & Ouyang, 2024).

5.1 Thematic Analysis of Green HRM Practices and Workforce Development

A review of recent studies highlights five core Green HRM practices that directly impact workforce development. These practices shape employee behavior, workplace sustainability, and corporate performance. The table below summarizes the key Green HRM practices and their impact on workforce development:

Table 5: Green HRM Practices and Their Impact on Workforce Development

Green HRM Practice	Impact on Workforce Development
Green Recruitment & Selection	Attracts environmentally conscious employees, builds sustainability-aligned workforce
Sustainability Training & Development	Improves employee awareness, enhances green skills & sustainability knowledge
Green Performance Management	Encourages accountability, integrates sustainability into performance evaluation
Green Compensation & Rewards	Provides incentives for eco-friendly behavior, fosters motivation
Employee Engagement &	Strengthens commitment to environmental goals,

Green Culture	enhances job satisfaction
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5.2 Impact of Green HRM Practices on Workforce Development

Green HRM practices contribute to multiple dimensions of workforce development, including employee productivity, sustainability awareness, and performance improvement. Figure 5 provides a graphical representation of the relative impact of each Green HRM practice on workforce development.

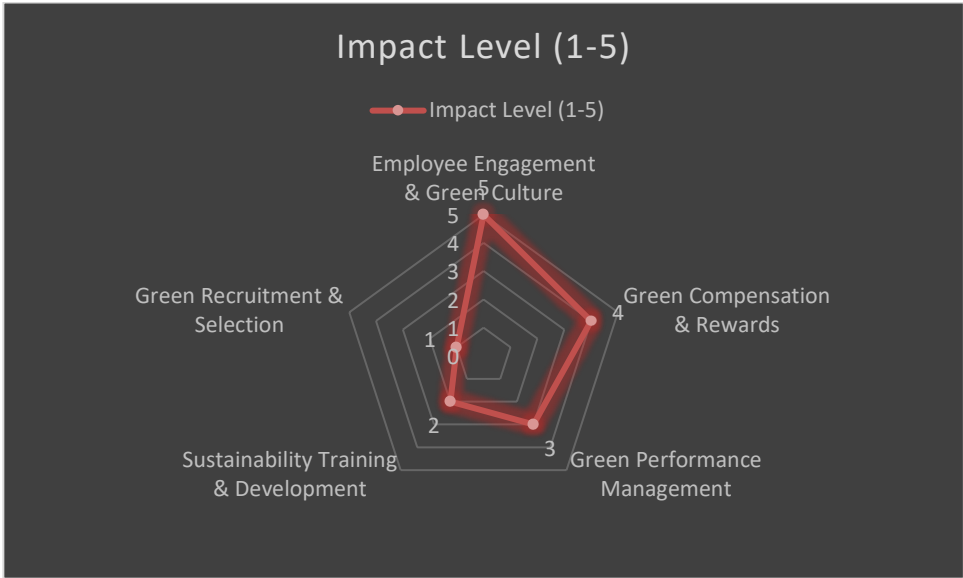


Figure 5: Impact of Green HRM Practices on Workforce Development

The following bar chart orders Green HRM practices according to their extent in shaping sustainable workforce behaviors. The impact of employee engagement and green organizational culture is the highest, then green compensation and rewards, which shows the growing importance of sustainability driven incentives.

Figure 5 shows that organizations having structured Green HRM policies exhibit higher employee motivation and longer employee commitment to the sustainability initiatives (Obeng et al., 2024).

5.3 Influence of Green HRM on Workforce Performance and Motivation

5.3.1 Employee Productivity and Performance

Similar to other processes, a firm can integrate sustainability principles in recruitment, training and performance evaluation to enhance employee engagement and performance outcomes. Employees who have been trained in sustainability driven practices are more efficient and eco conscious problem solvers (Lo Presti et al., 2024). Linking sustainability goals to performance appraisals is a culture of accountability and innovation that aids in employees’ overall workforce productivity (Rashid et al., 2023).

5.3.2 Employee Motivation and Job Satisfaction

Employee motivation is very much dependent on sustainability linked incentive programs and green reward systems. A serious research has stated that employees who are practically rewarded in reflective of green initiatives, recognition programs and the career development opportunities are more inclined towards giving better job satisfaction along with loyalty to the sustainability based organization like Sodexo (Budhwar et al., 2024).

Green HRM is a transformative approach to develop workforce through sustainability driven HR policies. The literature analysis regarding the theme shows that employee engagement, green training and sustainability focused performance management are the major drivers of workforce sustainability and corporate environmental responsibility. Further strengthening your competitive advantage in the green economy (Basu et al., 2023), organizations with AI driven HR analytics and digital workforce transformation as well as eco friendly reward systems will do so.

6. Comparative Analysis of Green HRM Practices Across Industries

Green Human Resource Management (GHRM) is not implemented in the same way in all industries. There has been some very rapid integration of sustainability driven HR practices in some sectors while others are only at early stages of adoption. Influence on energy HRM adoption is exerted by sectoral challenges, regulatory compulsions, environmental impact, and availability of resources to shelter sustainability programmes. Manufacturing and hospitality industries which tend to have high environmental footprint are usually those who are responsible (first) to integrate Green HRM due to the fact that they are pressured to have more sustainable workforce practices by industrial regulations (Bimo & Sulistyarningsih, 2024). In contrast, according to

the promotion of sustainability mandates (Huang, Law, & Ouyang, 2024), clean sectors like finance or banking do not adopt much quicker because there are no direct environmental impacts.

6.1 Green HRM Adoption Trends Across Industries

Green HRM has been implemented to different extents by different industries. Some of the industries currently actively integrate the sustainability initiatives into their HR strategies, and some naturally take up a passive position in adopting a compliance mode instead of transformation. Comparison of Green Human Resource Management adoption across key industries has been presented in table 6.

Table 6: Comparative Analysis of Green HRM Practices Across Industries

Industry Sector	Green HRM Adoption Level	Key Green HRM Practices	Challenges
Manufacturing	High	Sustainable production training, eco-friendly recruitment	High cost of implementation, employee resistance
IT & Technology	Medium	Remote work policies, paperless HR processes	Limited regulations, technological transition barriers
Healthcare	Medium	Energy-efficient workplace policies, green employee engagement	Compliance with healthcare safety standards
Finance & Banking	Low	CSR-driven HR strategies, carbon offset initiatives	Lack of standardized sustainability policies
Hospitality & Tourism	High	Green hiring, waste reduction programs, sustainability-linked incentives	Seasonal workforce fluctuations, resource management issues

Green HRM adoption in industries such as manufacturing and hospitality is higher since regulatory pressures and industry wide sustainability initiatives serve as a means for industries to adopt Green HRM. The IT and healthcare sectors are about at moderate of adoption levels with sustainability focused HR policies becoming competitive differentiators. On the other hand, the finance and banking sector with relatively lower direct environmental footprints, lags behind in

Green HRM adoption with CSR and voluntary sustainability commitment as the dominant areas of initiatives (Sarstedt & Danks, 2022).

6.2 Green HRM Adoption Levels: Industry-Wise Analysis

To better understand how different industries are integrating Green HRM, Figure 6 presents a graphical representation of adoption levels across sectors.

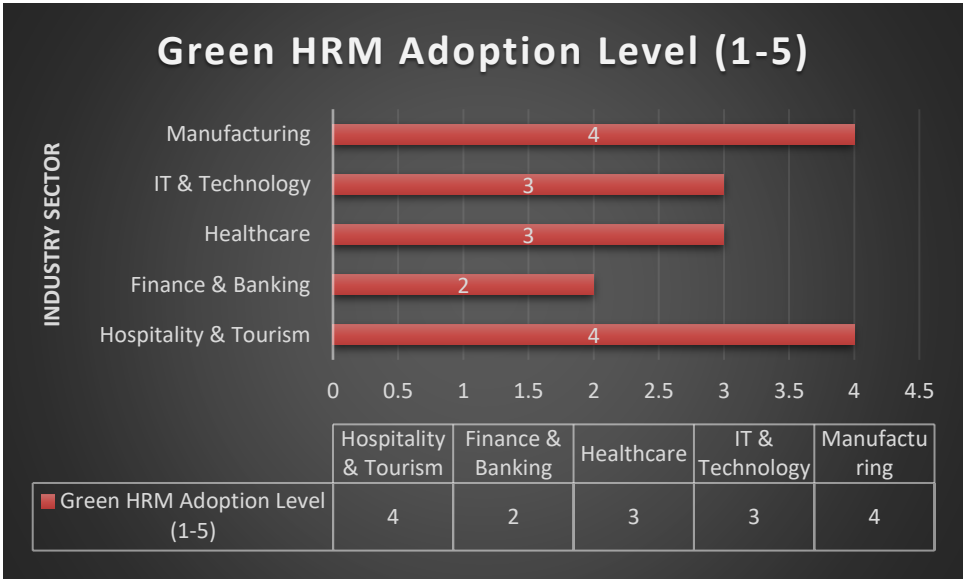


Figure 6: Green HRM Adoption Levels Across Industries

Green HRM implementation is more common in manufacturing and hospitality industries, while finance and banking sectors are less inclined to adopt it. Moderate adoption is shown by the IT and healthcare industries, which are undergoing changes towards sustainability driven HR policies.

Figures 6 show that the most adopted industries are those of manufacturing, hospitality sectors, with the growth driven by the same operational sustainability goals along with the government mandated compliance regulations (Barry & Wilkinson, 2022). The integration of sustainability in HR function especially through digital HRM tools, environment office policies and workforce engagement programs (Singh, Butterick & Charlwood, 2021; Butterick & Charlwood, 2021) has been possible in IT and healthcare sectors.

6.3 Industry-Specific Challenges in Green HRM Implementation

6.3.1 Manufacturing Sector

Green HRM implementation is more common in manufacturing and hospitality industries, while finance and banking sectors are less inclined to adopt it. Moderate adoption is shown by the IT and healthcare industries, which are undergoing changes towards sustainability driven HR policies.

The manufacturing and hospitality sectors have high adoption rates as shown in Figure 6 due to operational sustainability goals and government mandated compliance regulations (Barry & Wilkinson (2022)). However, the IT and healthcare sector are gaining ground in the adoption of sustainability in HR job functions such as through

digital HRM tools, eco friendly office policies, and environment friendly workforce engagement programs (Singh et al., 2021; Butterick & Charlwood, 2021).

6.3.2 IT & Technology Sector

Green HRM implementation is more common in manufacturing and hospitality industries, while finance and banking sectors are less inclined to adopt it. Moderate adoption is shown by the IT and healthcare industries, which are undergoing changes towards sustainability driven HR policies.

Given that Figure 6 shows that the manufacturing and hospitality sectors can be viewed as leaders in adoption, this is all attributed to the operational sustainability goals and the government mandated compliance regulations (Barry & Wilkinson, 2022). Despite the lack of comparable studies, the IT and health care sectors are paving way for integration of sustainability into HR functions, although, through use of digital HRM tools, eco friendly office policies and workforce engagement programs by the sector (Singh et al., 2021; Butterick & Charlwood, 2021).

6.3.3 Healthcare Sector

Green HRM adoption by healthcare organizations is a unique challenge with patient safety and operational efficiencies to be balanced with sustainability initiatives. Green HRM practices in this sector focus on energy-efficient infrastructure, waste reduction, and employee sustainability training. Nevertheless, Green HRM integration is hindered by strict compliance regulations as well as businesses’ concern over biomedical waste management and resistance to procedural changes (Lee & Isa, 2024).

6.3.4 Finance & Banking Sector

Green HRM adoption levels are low in the finance and banking industry because its environmental impact is less direct than in other industries. In this sector, most sustainability efforts are tied to CSR, carbon offset and ethical investment strategies. The main issue in the adoption of Green HRM in finance is the absence of standardized sustainability frameworks that make it difficult to enforce uniform green workforce policies in the industry (Rashid et al., 2023; Zhou et al., 2022).

6.3.5 Hospitality & Tourism Sector

Green HRM is one of the most adopted practices in the hospitality and tourism sector, as organizations try to reduce their environmental footprint by minimizing waste, green recruitment and employee engagement that is focused on sustainability. Nevertheless, the seasonal workforce fluctuations and variable resource availability limit the sustainability programs from being sustained on a long term basis. Moreover, eco-certifications and green workforce policies must be consistent with the customer expectations and industry specific operational constraints (Walkowiak, 2024).

7. Challenges and Barriers in Implementing Green HRM

Green Human Resource Management (GHRM) has been increasingly recognized as one of the hallmarks of corporate sustainability, only to be plagued by the difficult implementation of the same. Financial, technological, regulatory, and behavioral obstacles exist for organizations, regardless of industry, to adopt green HR practices without hindrance. However, large corporations with enough resources can integrate sustainability-driven HRM more easily than small and medium sized enterprises (SMEs) because of the financial and structural constraints (Bimo & Sulistyaningsih, 2024). Additionally, the absence of standardized regulations and the unwillingness to change the organization are still hindering the adoption of Green HRM in industries (Huang et al., 2024).

7.1 Key Challenges in Green HRM Implementation

Green HRM, despite its potential benefits, encounters multiple barriers that vary depending on industry, organizational culture, and available resources. Table 7 highlights some of the most significant obstacles organizations face when integrating sustainability into HRM.

Table 7: Challenges and Barriers in Green HRM Implementation

Challenges & Barriers	Description
High Implementation Costs	Investment in sustainable HR practices, training, and green technology can be costly, limiting adoption in SMEs.
Lack of Standardized Regulations	Absence of universal sustainability guidelines makes it difficult for organizations to implement uniform Green HRM policies.
Employee Resistance to Change	Employees may resist adopting new green policies due to lack of awareness, training, or motivation.
Limited Organizational Commitment	Many organizations prioritize short-term profitability over long-term sustainability, leading to weak adoption of Green HRM.
Technological & Infrastructure Constraints	Limited access to green HR technology, digital sustainability tools, and infrastructure hinders effective Green HRM implementation.

The challenges presented in Table 1 demonstrate that Green HRM adoption requires not just financial investment but also a shift in organizational mindset. Companies that lack sustainability-focused leadership often fail to integrate Green HRM effectively, leading to superficial compliance rather

than genuine transformation (Doghan, 2024).

7.2 Impact of Challenges on Green HRM Adoption

While Green HRM holds the potential to transform workforce sustainability, existing barriers slow down

its widespread adoption. Figure 7 visually represents the impact of the most significant obstacles hindering

Green HRM implementation.

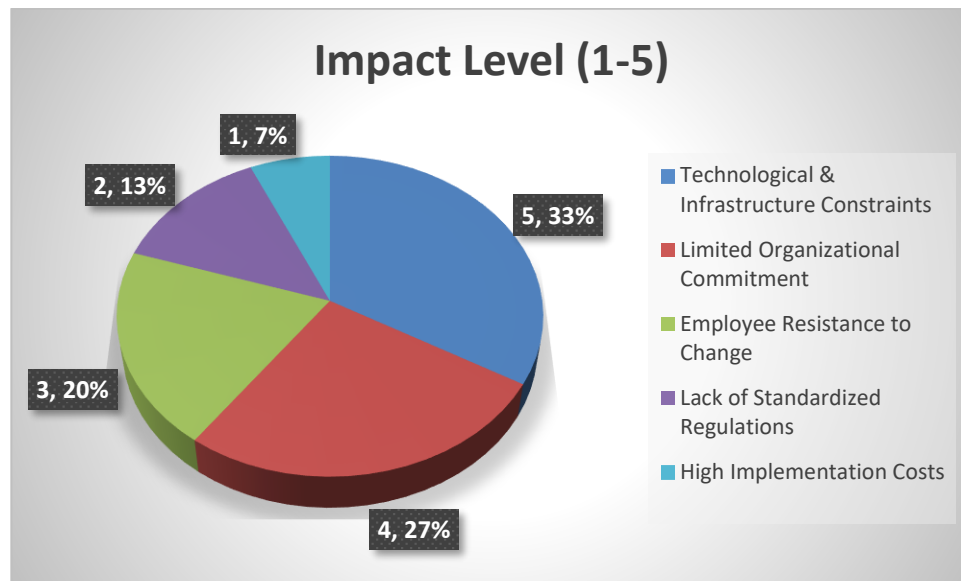


Figure 7: Key Challenges in Implementing Green HRM

From Figure 7, Green Human Resource Management (GHRM) has been identified as an essential aspect of corporate sustainability in recent years, however, implementation challenges persist. Financial, technological, regulatory, and behavioral obstacles exist for organizations, regardless of industry, to adopt green HR practices without hindrance. However, large corporations with enough resources can integrate sustainability-driven HRM more easily than small and medium sized enterprises (SMEs) because of the financial and structural constraints (Bimo & Sulistyaningsih, 2024). Additionally, the absence of standardized regulations and the unwillingness to change the organization are still hindering the adoption of Green HRM in industries (Huang et al., 2024).

7.4 Overcoming Barriers in Green HRM Implementation

Intervention strategies addressing these challenges must be considerate of both the organizational and policy levels. Those companies that do integrate Green HRM often do so in a structured manner to overcome financial, regulatory and technological constraints. However, several key strategies can be used to help organizations adopt Green HRM adoption more effectively.

1. Financial Support & Incentives: Organizations, especially SMEs, need government backed incentives, tax benefits and financial grants to reduce the cost burden of Green HRM implementation. Financial aid for sustainability driven workforce programs can be provided by public private

partnerships to facilitate the transition (Rossenberg et al., 2022).

2. Development of Standardized Sustainability Regulations: As no single Green HRM framework exists, there is a lack of a universal framework to standardize Sustainability Regulations. Clear sustainability guidelines should be established by regulatory bodies to define well defined Green HRM benchmarks (Rashid et al., 2023; Arslan et al., 2022).

3. Employee Engagement & Training Programs: Heavily utilized decisions include the awareness campaigns, sustainability training sessions, green HR workshops by organizations for importance work force engagements. Green HRM is more likely to be adopted by employees when they understand the impact of Green HRM on corporate and environmental sustainability (Subramanian & Suresh, 2022).

4. Integration of Digital HRM Solutions: Companies should invest in AI-powered HR analytics, cloud-based HR platforms, and green HR dashboards to enhance their ability to monitor sustainability metrics. Digital transformation can significantly reduce HRM's environmental footprint while improving operational efficiency.

5. Embedding Green HRM into Corporate Strategy: Organizations have to move Green HRM from a short term compliance measure to an integral part of business strategy. Culture of environmental responsibility cannot be created without trust of leadership and long term sustainability roadmaps.

If these strategic interventions are appropriately applied, such a gap can be filled in between sustainability objectives and the practices of human resources management, and organizations can achieve transition to a more sustainable workforce (Obeng et al., 2024; Prikshat et al., 2023). Though increasingly important, the implementation of Green HRM is confronted by many critical challenges including very high costs, technological constraints, employee resistance as well as the lack of standardized sustainability regulations. Green HRM barriers analysis shows that organizations need to take a multi faceted approach to overcome these challenges. Financial constraints continue to be the biggest obstacle, in particular for SMEs and pipelined organisations. There are also technological and infrastructure barriers preventing companies from mass adoption of AI-driven sustainability tools and HR automation frameworks, since many are not even using these. Additionally, there is no universal sustainability regulation leading to various adoption patterns across different industries, which makes a coherent Green HRM policy difficult to be established. In order to mitigate these obstacles, organizations have to relegate financial worth, the workforce engagement, compliance and the digital HR transformation as foremost capital expenses. Creating incentive programs, standardized sustainability regulations and capacity building are critical for the governments and the policymakers to support businesses. In the context of the long term sustainability of workforce, integration of Green HRM will become a necessity rather than a choice, as

organizations continue to compete in a global economy that is increasingly environmentally conscious.

8. Future Directions for Green HRM Research

In recent years, Green Human Resource Management (GHRM) field has been attracting attention, however, there are still many gaps in research and practical implementation. The interest in Green HRM is also driven by the adoption of Green HRM in order to make the business sustainable and to find transformation in the workforce (Bimo and Sulistyaningsih, 2024). In order to facilitate their widespread adoption, future studies must overcome existing limitations and search new grounds where AI driven HRM, policy driven sustainability, and industry wide standardization are going to become the dominant trends (Huang et al., 2024).

According to the proposed research areas, this section will help define the future of Green HRM and show the main pushing points of academic and industrial developments.

8.1 Key Areas for Future Research in Green HRM

The existing literature and trends in industry provide a set of several priority areas for future Green HRM research. The thematic overview of future research is presented in Table 8, emphasizing critical areas where additional work is needed.

Table 8: Future Directions for Green HRM Research

Future Research Areas	Research Significance
AI and Digital Transformation in Green HRM	Exploring AI-powered HR analytics and automation for sustainability tracking.
Cross-Cultural and Industry Comparisons	Comparing Green HRM adoption across different cultures and industries to identify best practices.
Long-Term Impact of Green HRM on Workforce Productivity	Assessing the long-term effects of Green HRM on employee performance, engagement, and retention.
Regulatory and Policy Developments	Analyzing the role of global sustainability policies and corporate regulations in Green HRM implementation.
Sustainability-Driven HRM in SMEs	Investigating challenges and opportunities for small and medium enterprises (SMEs) in adopting Green HRM.

The research areas presented in Table 1 highlight the growing importance of digital transformation,

cultural adaptation, long-term sustainability impact, and regulatory alignment in shaping the future of Green HRM (Radonjić et al., 2024).

8.2 Graphical Representation of Priority Research Areas

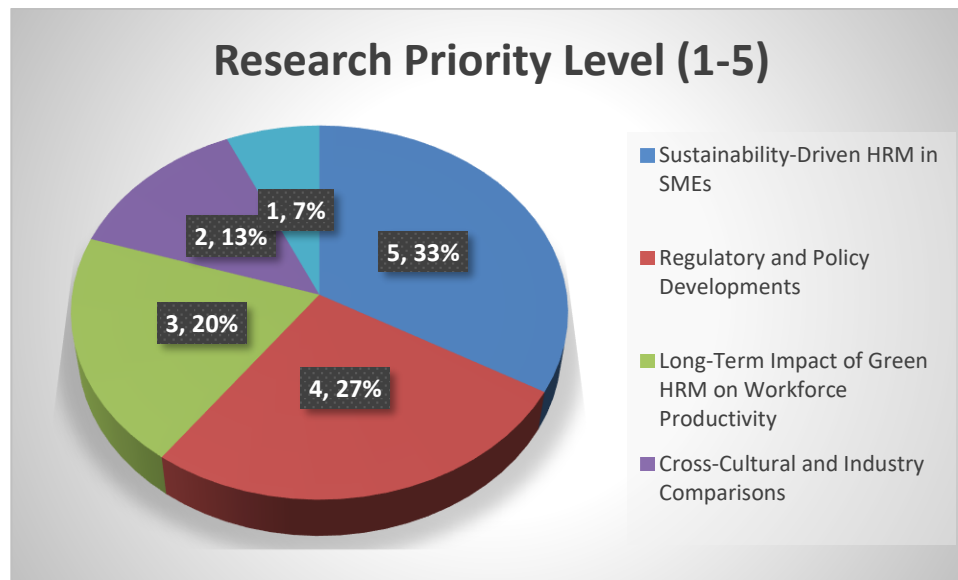


Figure 8: Priority Areas for Future Green HRM Research

As shown in Figure 8, the highest-priority research area is sustainability-driven HRM in SMEs, followed by regulatory and policy developments. These findings reflect the need for comprehensive sustainability frameworks that align Green HRM strategies across industries and organization sizes (Obeng et al., 2024; Devaraju, 2024).

8.3 Implications for Researchers and Industry Practitioners

Future research must focus on bridging the gap between theory and practice to enhance the effectiveness of Green HRM adoption across industries. Academics should develop quantitative and qualitative research models that evaluate the real-world impact of Green HRM policies on workforce engagement, employee retention, and corporate environmental performance. Industry practitioners should collaborate with policymakers to ensure alignment between corporate sustainability goals and regulatory requirements (Lo Presti et al., 2024).

To drive meaningful progress in Green HRM, future studies should explore:

- The role of AI, big data, and digital HR transformation in automating and optimizing sustainability-driven workforce strategies.
- Longitudinal studies evaluating Green HRM's

To further illustrate the emerging focus areas in Green HRM, Figure 1 presents a graphical ranking of research priorities based on their potential impact on workforce sustainability and organizational competitiveness.

long-term impact on employee engagement, organizational reputation, and financial performance.

- Comparative analyses of Green HRM adoption across industries and cultures, identifying best practices for universal sustainability integration.
- Governmental and corporate policy interventions to create standardized guidelines for Green HRM implementation.

These research priorities will play a crucial role in shaping the next phase of sustainability-driven workforce management, ensuring that Green HRM continues to evolve as a strategic asset for businesses in the green economy (Knies et al., 2022).

9. Conclusion

The concept of Green Human Resource Management (GHRM) represents a new HR practice, which aims to change workforce development by integrating sustainability in it. This review discusses the vital role of green recruitment and training, sustainability and performance evaluation, and eco incentives in creating a workforce that is represented by sustainability. Green HRM is linked to increased employee motivation, organizational sustainability

improvement and organizational competitiveness. Even though the GHRM adoption can offer benefits, it is confronted with barriers, including high implementation cost, absence of regulatory standardization, employees' resistance and technological limitation. Based on industry wise analysis, manufacturing and hospitality has engaged in high levels of Green HRM adoption due to regulatory pressures, while the finance and banking have been small on accounts of fewer direct sustainability mandates. Efforts on the future of work sustainability should be driven by AI, investigation on cross cultural adaptation of HRM and assessments of its long term consequences are still to be embarked upon. Therefore, digital transformation, big data, and AI will lead to further

automation of sustainability tracking, improvement of compliance and optimisation of HR efficiency. Also, Green HRM practices ought to be standardized across the industries through policy driven framework. In the course of businesses' transition toward a green economy, Green HRM will play a crucial role in developing sustainable workforces, creating green organizations, and driving corporate strategies that conform to global sustainability goals. Green HRM brings organizations various benefits that are harnessed by their commitment to achieve long term sustainability, employee engagement and innovation. Corporate resilience and workforce sustainability will be driven by its continued evolution leading to corporate success in a highly environmentally conscious world.

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