



Green HRM Research Gaps and Future Agenda: A Systematic and Bibliometric Synthesis

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ABSTRACT

In response to the increasing demand for environmentally sustainable organizational practices, Green Human Resource Management (GHRM) has gained prominence as a strategic integration of ecological values into core HRM functions. Despite growing scholarly interest, GHRM research remains fragmented and methodologically limited, often lacking contextual and longitudinal insights. This study aims to systematically synthesize existing literature and identify key research gaps and future directions. Using a Systematic Literature Review (SLR) combined with bibliometric analysis, 31 peer-reviewed articles indexed in Scopus from 2021 to 2025 were critically examined. VOSviewer software was employed to visualize co-occurring keywords, author networks, and thematic clusters. The findings indicate that core GHRM practices such as green recruitment, training, and appraisal are central to fostering innovation, sustainability performance, and organizational transformation. Recent trends highlight a shift towards integrating digitalization, artificial intelligence, and Industry 4.0 into GHRM frameworks. However, research remains largely concentrated in specific regions and sectors, with limited representation of SMEs, non-profit institutions, or diverse cultural contexts. Additionally, external stakeholder engagement, ESG-linked HR strategies, and data-driven sustainability reporting are underexplored. This study proposes an integrative GHRM model linking global sustainability pressures with strategic HR outcomes including green innovation, digital alignment, and stakeholder accountability. The article contributes both conceptually and practically by consolidating the theoretical base of GHRM and informing future research agendas that are inclusive, adaptive, and forward-looking.

Keywords: Green Human Resource Management; Green HRM; Sustainable HRM

INTRODUCTION

In recent decades, modern business practices have undergone a paradigm shift toward environmental sustainability. Organizations are no longer solely profit-oriented; instead, they are increasingly committed to social and ecological responsibilities. Within this context, Green Human Resource Management (GHRM) has emerged as a strategic approach that integrates environmental values into the entire spectrum of human resource management processes. GHRM encompasses a range of policies and practices, including green recruitment, sustainability-oriented training, green performance appraisals, and incentives for pro-environmental behavior all aimed at fostering an environmentally conscious organizational culture (Budiani & Sopia, 2022; Choudhary & Datta, 2024).

The literature on GHRM has shown a significant upward trend since the early 2010s, in parallel with growing global attention to environmental issues and organizational sustainability. A bibliometric study by Mehta (2024) highlighted a notable surge in publications during the 2017–2022 period, with Asian countries such as China, India, and Malaysia being among the most active contributors. Leading journals such as the *Journal of Cleaner Production* and *Sustainability* have served as key publication platforms (Budiani & Sopiah, 2022), while researchers like Charbel Jabbour and Chiapetta Jabbour are recognized as major contributors to the development of GHRM literature (Wardhana & Muafi, 2021).

Bibliometric visualizations using tools like VOSviewer have revealed a knowledge structure composed of thematic clusters such as the relationship between GHRM and green innovation, employee engagement, and organizational performance. Wardhana and Muafi (2021) identified five major clusters in the GHRM literature based on keyword co-occurrence, while Budiani and Sopiah (2022) noted that practices such as green training and green performance appraisals have dominated the academic discourse over the past decade.

Nevertheless, several literature reviews have indicated that GHRM research remains fragmented. Many studies adopt a descriptive focus with limited geographical and sectoral contexts, relying predominantly on homogeneous methodologies particularly cross-sectional quantitative surveys (Mehta, 2024; Budiani & Sopiah, 2022). As a result, the generalizability of findings is limited, and the research has yet to capture the dynamic and long-term nature of GHRM, especially in underexplored contexts such as the public and education sectors.

One of the notable developments in GHRM literature is the growing interest in its link with employee green creativity (EGC). Choudhary and Datta (2024) demonstrated that consistent GHRM practices can foster employees' green creativity, particularly in the hospitality and tourism industries. However, they also emphasized that such studies remain scarce and that cross-cultural approaches are needed to enhance external validity.

Recent studies have also begun to uncover mediating factors such as work values, green leadership, and organizational culture that can either strengthen or weaken the relationship between GHRM and organizational performance. For example, Mehta (2024) highlighted that employees' intrinsic and social values mediate the relationship between green training and work engagement. However, most of these studies remain conceptual or are limited to large organizations in developing countries, thereby excluding the perspectives of SMEs or non-profit organizations.

A systematic review by Budiani and Sopiah (2022) concluded that the impact of GHRM on organizational performance has been predominantly examined from an internal perspective (e.g., employee satisfaction and commitment), rather than external outcomes such as environmental reputation or customer trust. This presents an opportunity for future research to further explore the implications of GHRM on external stakeholders.

Methodologically, the majority of GHRM research continues to rely on cross-sectional quantitative designs, with very few studies adopting longitudinal approaches, case studies, or mixed methods. This represents a major limitation that hinders deeper and more contextualized understanding. Budiani and Sopiah (2022) also pointed out that most research fails to systematically address the barriers to GHRM implementation such as value conflicts between business efficiency and sustainability costs, cultural resistance, or limited green leadership capacity.

From a geographical perspective, GHRM studies are significantly skewed. Wardhana and Muafi (2021) noted that most research is concentrated in Southeast and South Asia, while regions such as Africa, Latin America, and Eastern Europe remain largely underrepresented. This results in a lack of inclusivity in GHRM theory development with respect to broader global contexts.

The evolution of GHRM literature in the post-COVID-19 era is another underexplored area. Despite the pandemic's profound impact on HRM structures and priorities including work flexibility, HR digitalization, and sustainability concerns few studies have reassessed the relevance and adaptability of GHRM principles in the post-pandemic context.

In the bibliometric analysis by Budiani and Sopiah (2022), five major research clusters were identified: green recruitment & selection, green training & development, green performance appraisal, green compensation, and green organizational culture. However, most studies within these clusters have not thoroughly examined the interactions among these elements or how organizational contexts influence their effectiveness in practice.

In conclusion, this preliminary review reveals a pressing need for a systematic synthesis of the GHRM literature to better understand dominant thematic structures, emerging research trends, and existing knowledge gaps. By adopting a Systematic Literature Review (SLR) approach supported by bibliometric mapping using VOSviewer, this article aims to construct a structured and replicable scientific map of the GHRM field.

This article is expected to offer a theoretical contribution by consolidating the conceptual foundations of GHRM and a practical contribution by informing the development of environmentally sustainable HRM strategies. Furthermore, by identifying research gaps and mapping strategic themes, this article sets out a future research agenda that is more contextual, relevant, and adaptive to the increasingly complex challenges of modern organizations.

METHOD

This study adopts a Systematic Literature Review (SLR) approach combined with bibliometric analysis to examine the conceptual development, publication trends, and future research directions in Green Human Resource Management (GHRM). The SLR method ensures that data collection and literature synthesis are conducted in a systematic, objective, and transparent manner (Ghadge et al., 2020; Snyder, 2019). Bibliometric analysis complements this by mapping the intellectual structure of GHRM literature, identifying the most influential scholars, and revealing dominant thematic areas in the knowledge network (Donthu et al., 2021).

The data for this study were sourced from the Scopus database, selected for its extensive and reputable coverage in management, business, and social sciences. The literature search strategy in this study focused on three main keywords: "green human resource management", "green HRM", and "sustainable HRM". These keywords were applied across three specific search fields: title, abstract, and keywords. To ensure the quality and relevance of the selected articles, several filters were implemented: the document type was limited to peer-reviewed journal articles, the language of publication was restricted to English, the publication period ranged from 2021 to 2025, and the subject areas were confined to Business, Management and Accounting; Social Sciences; and Environmental Science. This approach was adopted to gather a credible, relevant, and representative body of literature that captures the comprehensive development of the Green Human Resource Management (GHRM) research domain.

The article selection process in this study was conducted in accordance with the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) protocol to ensure transparency, replicability, and academic rigor. Inclusion criteria were established to guide the systematic selection of relevant literature. Specifically, the review included empirical or conceptual articles that explicitly address Green Human Resource Management (GHRM), studies discussing specific GHRM practices such as green training, green recruitment, green performance appraisal, and green leadership and articles published in peer-

reviewed international journals indexed by Scopus. Conversely, exclusion criteria were applied to omit conference proceedings, editorials, book reviews, working papers, non–full-text articles, and those deemed irrelevant to GHRM based on initial title and abstract screening. The systematic search initially identified 365 articles, from which duplicates were removed both automatically and manually. The remaining articles underwent a title and abstract screening, followed by a full-text review to assess eligibility, resulting in a final inclusion of 31 articles for full analysis. The detailed selection process is illustrated in the PRISMA flow diagram provided in the appendix.

To further enrich the review, a Systematic Literature Review (SLR) was complemented by a thematic content analysis of the included articles. This process involved identifying each article’s research objectives, methodologies, key variables, and theoretical contributions, then categorizing them into thematic clusters such as green behavior, green leadership, green commitment, green innovation, and green performance. The findings were synthesized to track conceptual and methodological trends in the evolving GHRM literature, in line with prior frameworks (Renwick et al., 2013; Boiral et al., 2015). In addition, a bibliometric analysis was conducted using VOSviewer version 1.6.19. This involved three main procedures: keyword co-occurrence analysis to identify dominant keywords and thematic relationships; co-citation analysis to highlight the most influential authors and publications; and bibliographic coupling to uncover inter-article connections based on shared references. The parameters for the VOSviewer analysis included a minimum keyword occurrence threshold of five, the use of LinLog/modularity clustering as the normalization technique, and the generation of both network visualization and density visualization maps to represent bibliometric relationships.

To enhance the rigor and reliability of the review process, article selection and evaluation were conducted independently by two researchers, with discrepancies resolved through discussion and consensus. Furthermore, all bibliometric procedures were fully documented to ensure transparency and facilitate future replication, as recommended by Kitchenham (2007) and Zupic & Čater (2015). Nonetheless, several limitations of the review are acknowledged. These include the exclusive use of the Scopus database, which may have resulted in the omission of relevant studies indexed elsewhere, the restriction to English-language publications, which potentially excluded valuable non-English research, and the exclusion of literature published after 2025 due to the defined timeframe of the data extraction.

RESULT AND DISCUSSION

Result

This section presents the main findings from the bibliometric analysis conducted on the Green Human Resource Management (GHRM) literature, which includes the mapping of intellectual structure, research trends, and the development of conceptual relationships over the past two decades. Network, overlay, and density visualizations offer a comprehensive depiction of dominant topic positions, interrelated keywords, and the evolutionary direction of research in this domain. The analysis was systematically carried out using VOSviewer software, following the approach adopted from Kitchenham (2004) and Zupic & Čater (2015), which enables objective intellectual and thematic mapping. Figure 1 illustrates the network visualization and can highlight the results as follows:

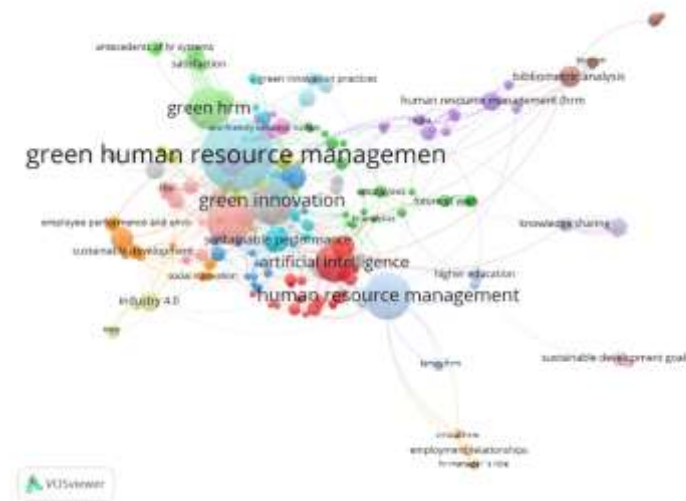


Figure 1 Network Visualization

literature concerning Green Human Resource Management (GHRM). The analysis captures the intellectual structure, research trends, and evolving conceptual relationships within this field over the past two decades. Using network, overlay, and density visualizations, this study offers a comprehensive overview of dominant themes, keyword interconnections, and the trajectory of scholarly discourse. The analysis was carried out systematically using VOSviewer, following established methodologies by Kitchenham (2004) and Zupic & Čater (2015), which facilitate objective mapping of intellectual and thematic structures.

The findings are critically examined in light of the research gaps identified in the earlier stages of this review. The discussion aims to connect the bibliometric results with theoretical and practical considerations, while also proposing a future research agenda that is both focused and contextually relevant. The elaboration is thematically structured, addressing dominant constructs, conceptual linkages, and the emergence of new trends such as the integration of artificial intelligence, sustainability, and green innovation into human resource practices. Figure 2 illustrates the overlay visualization and can highlight the results as follows:

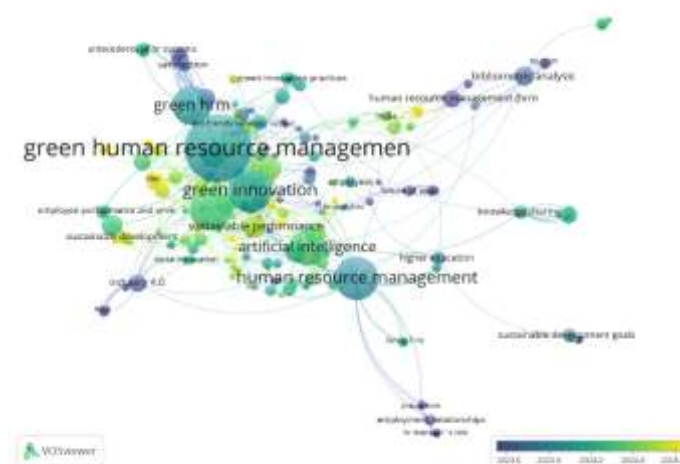


Figure 1 Overlay Visualization

The overlay visualization offers a temporal perspective on the development of Green Human Resource Management (GHRM) literature by mapping the evolution of key terms based on their average publication year. Blue shades represent terms that were dominant in earlier publications (around 2023), while green to yellow hues indicate more recent topics emerging up to 2025.

From the map, it is evident that core terms such as *green human resource management*, *green HRM*, and *green innovation* have appeared since the early stages of research development and continue to serve as central points of gravity. The green coloration of these terms signifies that they remain highly relevant and are being further reinforced in the latest studies. This consistency highlights the sustained focus of the literature on integrating environmentally responsible practices into human resource management functions.

The appearance of bright yellow in terms like *artificial intelligence*, *industry 4.0*, and *HR analytics* reflects an emerging trend in GHRM research namely, the integration of digital technologies and automation as critical elements of green-oriented HR strategies. This signals a shift in focus from merely implementing green policies toward optimizing efficiency and enabling data-driven decision-making.

Simultaneously, the emergence of terms such as *bibliometric analysis*, *India*, and *higher education* in yellow tones indicates that the application of bibliometric methods and the exploration of geographic and institutional contexts are still relatively new but promising research domains that warrant further exploration.

Other recently highlighted terms such as *sustainable development goals* and *knowledge sharing* suggest a growing interest in integrating global sustainability goals (SDGs) and the significance of knowledge management within the GHRM framework. These developments reflect a trend toward cross-sectoral and collaborative approaches that have become more prominent in the most recent phase of research.

Conversely, terms shaded in blue such as *critical HRM*, *employment relationships*, and *HR manager's role* represent more classical themes that have been widely discussed in earlier studies. While no longer at the forefront of current research trends, these foundational concepts remain theoretically important and serve as essential underpinnings for newer investigations.

In summary, the overlay visualization confirms a thematic shift in GHRM literature from normative and policy-focused concerns toward the integration of technology, institutional collaboration, and strategic approaches to sustainability. These findings further underscore the importance of shaping future research agendas that bridge classical conceptual foundations with emerging digital innovations and the globalization of sustainability values. Figure 3 illustrates the density visualization and can highlight the results as follows:



Figure 3 Density Visualization

The density visualization provides a graphical representation of the concentration of key terms within the Green Human Resource Management (GHRM) literature. In this heatmap, brighter colors (yellow) indicate terms with higher frequency and significance within the knowledge network, while shades of green to blue reflect relatively lower density and importance.

The visualization reveals that the term green human resource management appears in the brightest and most central position, signifying its absolute dominance as the core concept in the field. This can be interpreted as the epistemological center of current research, serving as the focal point of all related discourses.

Other prominent terms such as green innovation, human resource management, and artificial intelligence also appear in bright yellow, indicating their frequent co-occurrence and growing recognition as integral components of the GHRM discourse. This highlights the scientific community's increasing attention to the integration of sustainability-oriented HR practices with innovative technologies.

The high density of sustainable performance and sustainable development further reflects an emphasis on outcome dimensions in GHRM practices not merely on policy implementation but also on the measurement and achievement of tangible sustainability performance. This suggests a shift in orientation from process-based approaches to performance-driven strategies.

Meanwhile, terms such as employee performance and environment, social innovation, and industry 4.0 are situated in light green zones, indicating their growing yet still developing contributions. Terms like HR analytics, knowledge sharing, and higher education are also gaining prominence, although they have not yet become central to the discourse. These findings suggest potential avenues for further research, particularly in exploring the roles of data, educational institutions, and collaborative managerial processes within the GHRM ecosystem.

On the other hand, terms such as employment relationships, HR manager's role, and critical HRM are found in the green-blue areas, indicating that while they have surfaced in the literature, they remain underexplored in terms of quantitative attention. These represent potential gaps that warrant further investigation, especially in highlighting critical dimensions and the role of actors in GHRM practices that may have been previously marginalized.

Overall, the density visualization not only maps the conceptual dominance within GHRM research but also indicates future directions and reveals research gaps that can inform the agenda for subsequent studies. The strong focus on technology, sustainability performance, and innovation signals a need for the integration of multidisciplinary and strategic approaches in forthcoming scholarly efforts.

Discussion

Recent literature indicates that Green Human Resource Management (GHRM) has undergone a fundamental shift from being a peripheral environmental policy to becoming a strategic approach deeply rooted in organizational dynamics, external pressures, and digital transformation. This evolution reflects a paradigm shift in HRM, from a traditionally administrative function to a key driver of innovation and sustainable competitiveness. Within this context, GHRM is increasingly recognized as an integrative instrument to address complex environmental, social, and economic challenges.

Li et al. (2024) highlight the significance of path dependence in understanding the antecedents of GHRM. They argue that green HR practices do not emerge spontaneously as novel initiatives; rather, they evolve from historical trajectories, policy structures, and ingrained organizational values. In other words, organizations with a legacy of adaptive and

change-oriented HRM practices are more likely to adopt GHRM comprehensively.

As a result, organizational culture, internal structures, and institutional legitimacy become critical determinants of GHRM success. In more conservative firms, the greatest challenge lies not in the lack of environmental awareness, but in structural resistance to transformation. Thus, the effectiveness of GHRM is inextricably linked to an organization's internal readiness to respond to external demands.

Building on this discourse, Ly (2025) integrates the perspective of the circular economy into the GHRM framework. He emphasizes that GHRM is not merely a tool for achieving environmental efficiency but also a strategic platform for fostering circular and sustainable business models. This approach requires inclusive leadership that promotes cross-departmental collaboration and employee empowerment in co-creating sustainable value.

From a global perspective, Shahid et al. (2025) connect GHRM to the Sustainable Development Goals (SDGs), underscoring the importance of aligning HRM strategies with the global development agenda. They assert that GHRM can serve to harmonize corporate objectives with the 17 SDGs, thereby making organizations more responsive to the expectations of society and global stakeholders.

Zhang et al. (2025) add another dimension by highlighting the importance of green knowledge and innovation as outcomes of effective GHRM. They demonstrate that employee training and development in sustainability can enhance organizational innovation capabilities. This is particularly vital in empowering groups such as women in green entrepreneurship.

Tabares et al. (2025) expand the GHRM framework by examining the twin transition phenomenon, namely the simultaneous integration of digital transformation and sustainability. Here, GHRM serves as the nexus between digital technology adoption and the promotion of green values. HR becomes a critical pillar bridging technological development with the cultivation of environmentally conscious competencies.

This transformation pushes organizations not only to recruit and train technology-savvy talent but also to ensure that these individuals understand the importance of sustainability in all business processes. GHRM, in this context, drives an innovative culture that is both environmentally aware and adaptive to technological disruption.

Externally, Bornay-Barrachina et al. (2023) find that organizations are increasingly responding to sustainability pressures by strategically redesigning their HR systems. Practices such as green appraisals, employee engagement in sustainability initiatives, and ESG-based compensation are becoming new norms demanded by markets, regulators, and consumers.

This shift places HR at the center as a strategic change agent rather than a mere administrative executor. HR professionals must now possess a comprehensive understanding of the sustainability landscape and translate it into actionable policies and systems.

Casprini et al. (2024) provide a unique perspective by focusing on family-owned businesses. They reveal that traditional values embedded in family enterprises can either support or hinder GHRM implementation. HR decisions in such firms are often influenced by emotional and generational values, requiring a context-sensitive approach that is attuned to family dynamics.

Similarly, Fareri et al. (2023) stress the growing importance of green and digital skills in the manufacturing sector. They argue that HR plays a critical role in identifying skill gaps, redesigning training curricula, and building career development systems that support this dual skill transition.

These changes demand a proactive and strategic orientation in HRM. The HR function is no longer confined to recruitment; it must shape employee capacity and mindset to embrace both the green and digital industrial eras simultaneously.

In the service sector particularly hospitality António and Rita (2023) observe that HRM

has significantly shifted towards sustainability over the past two decades. They identify GHRM as a key competitive differentiator in the industry, as consumers increasingly value ethical and environmental considerations in service selection.

In this context, GHRM practices include energy-efficient work design, green value-based service training, and employee incentives for sustainable initiatives. Thus, GHRM not only impacts internal organizational processes but also influences customer perception and loyalty.

On another front, O'Reilly et al. (2025) note that HR professionals now play a crucial role in sustainability reporting. Their responsibilities extend beyond compiling annual HR reports to include ESG disclosures and real-time sustainability performance tracking.

Organizational accountability for sustainability now hinges on HR systems that are transparent, accurate, and data-driven. HR stands at the core of ensuring that all corporate activities are well-documented and auditable for both external scrutiny and internal improvement.

Collectively, these studies signal that GHRM is no longer a passing trend but a long-term strategic framework crucial to organizational success amidst environmental, social, and economic pressures. The HR function has not only transformed functionally but also normatively as a steward of sustainability values and direction.

Thus, GHRM has evolved into a complex system involving internal adaptation, external responsiveness, and cross-sectoral collaboration. Practices such as green recruitment, green training, and employee engagement in sustainability projects are core components in creating long-term organizational value.

Within this framework, innovation, organizational transformation, and stakeholder accountability emerge as three key outcomes of effective GHRM. Together, these outcomes converge to foster sustainable organizational performance marked not only by operational efficiency but also by reputational excellence and enduring value creation.

Based on the synthesis of 20 recent articles, the Green Human Resource Management (GHRM) approach has emerged not only as a strategic trend but also as an adaptive necessity in responding to global pressures such as the Sustainable Development Goals (SDGs), circular economy, and sustainability reporting expectations (ESG). Its practical implications affect multiple dimensions of the human resource (HR) function in modern organizations.

GHRM requires strategic integration into the company's vision, rather than functioning merely as an administrative task. The HR unit must act as a primary facilitator of green and digital transformation, engaging from the early stages of sustainability planning (Tabares et al., 2025; Bornay-Barrachina et al., 2023). Developing green competencies is also a critical priority. Organizations must establish training systems that combine green and digital skills tailored to specific sectoral characteristics and industrial challenges (Fareri et al., 2023; António & Rita, 2023).

Sustainability-oriented recruitment and performance evaluation practices are becoming essential. Organizations are encouraged to embed pro-environmental indicators into employee selection and appraisal processes (Li et al., 2024; Shahid et al., 2025). HR also plays a vital role in fostering an organizational culture that supports circular business models, including shaping employees' mindsets to be more adaptive to resource efficiency and sustainable innovation (Ly, 2025). Furthermore, data-driven sustainability reporting is emerging as a new HR domain, supporting ESG disclosures and contributions to the SDGs (O'Reilly et al., 2025).

While GHRM's theoretical contributions have evolved significantly, several research gaps remain for future agendas. Current studies are predominantly situated in Global North contexts and large corporations, with limited exploration of GHRM in developing countries

and small- to medium-sized enterprises (Casprini et al., 2024). Additionally, most research adopts cross-sectional designs, offering little insight into the longitudinal dynamics of GHRM implementation over time (Li et al., 2024). Local cultural dimensions and informal practices have also been underexplored, despite their significant influence on the effectiveness of HR policies especially in family firms and across Asian regions (Casprini et al., 2024).

Experimental quantitative research testing the effects of GHRM policies on employee behavior remains scarce (Zhang et al., 2025), and external stakeholder involvement such as from communities, regulators, and consumers is often overlooked in research designs (Shahid et al., 2025; O'Reilly et al., 2025). Yet, the success of green strategies heavily depends on the interaction between organizations and their external environments.

To summarize these findings, an integrative Green HRM model is proposed that illustrates the linkages between global external pressures, core GHRM practices, and their impact on innovation, organizational transformation, and stakeholder accountability. This model identifies core GHRM practices such as green recruitment, green training, green appraisal, and employee green engagement as central mechanisms connecting global drivers to three key impact areas: the creation of green knowledge and innovation (Zhang et al., 2025; Tabares et al., 2025); organizational transformation toward digital-green alignment (Li et al., 2024; Fareri et al., 2023; Ly, 2025; Casprini et al., 2024); and improved accountability and strategic stakeholder relationships (Shahid et al., 2025; O'Reilly et al., 2025; Bornay-Barrachina et al., 2023).

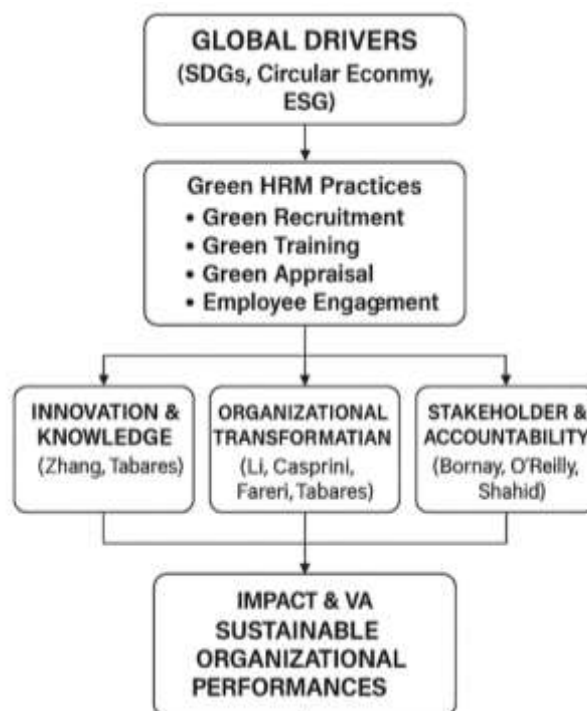


Figure 4. Integrative GHRM Model

Together, these pillars synergistically promote sustainable organizational performance and long-term competitive advantage positioning GHRM not merely as an internal HRM tool, but as a foundational element of future-oriented corporate strategy.

CONCLUSION

The present study offers a rigorous and holistic synthesis of the Green Human Resource Management (GHRM) literature by employing a combined Systematic Literature Review

(SLR) and bibliometric approach. This dual-method strategy allowed for a structured understanding of conceptual developments, publication trends, and emerging scholarly directions in the field of GHRM over the past two decades.

The findings underscore the growing strategic significance of GHRM in aligning human capital management with broader environmental sustainability objectives. No longer confined to peripheral CSR initiatives, GHRM has evolved into an organizational imperative that influences both internal HR processes and external stakeholder engagement.

Central to the development of GHRM is the integration of core practices such as green recruitment and selection, green training and development, environmentally oriented performance appraisal, and employee engagement in sustainable initiatives. These practices form the backbone of environmentally responsible HRM and are increasingly recognized as catalysts for organizational transformation.

Bibliometric visualization revealed the intellectual landscape of the field, showing a thematic consolidation around innovation, sustainability performance, and digital transformation. Notably, emerging terms such as artificial intelligence, Industry 4.0, and HR analytics suggest that digital integration is becoming a pivotal factor in the evolution of GHRM.

At the same time, overlay analysis highlighted a temporal shift in research themes from foundational concepts such as environmental HRM and critical employment relations toward more dynamic constructs like green innovation ecosystems, sustainable development goals (SDGs), and data-driven HR systems. This indicates a maturing field that is expanding its theoretical and practical boundaries.

An important observation from this study is the rising role of HR departments as strategic enablers of sustainability. Far from being merely administrative units, HR functions are now tasked with shaping organizational values, driving change management, and ensuring the long-term viability of sustainability efforts.

GHRM has also proven instrumental in enabling organizations to navigate the "twin transition" the concurrent pressures of digital transformation and environmental sustainability. This dual mandate requires HR professionals to develop and implement integrated strategies that foster both green competencies and digital literacy across the workforce.

From a theoretical standpoint, the study demonstrates that GHRM is deeply embedded in organizational path dependencies, cultural structures, and institutional dynamics. Firms with a history of adaptive HRM and innovation are more likely to embrace GHRM as a transformative force. Conversely, organizations with rigid structures or traditionalist cultures may face resistance to implementing green HR policies effectively.

Despite its advancement, the current body of GHRM literature displays several limitations. The geographical concentration of research in countries like India, China, and Malaysia has led to a regional skew in theoretical development, leaving regions such as Africa, Latin America, and Eastern Europe underrepresented. This imbalance restricts the generalizability and global relevance of existing findings.

Moreover, the dominance of cross-sectional methodologies in empirical studies limits the capacity to capture the longitudinal effects and dynamic nature of GHRM implementation. As organizational sustainability is a long-term pursuit, there is a pressing need for more longitudinal and mixed-method research designs that can account for complexity over time.

In terms of practical application, GHRM has increasingly influenced external organizational outcomes such as customer trust, environmental reputation, and stakeholder engagement. These findings underscore the relevance of expanding research beyond internal

employee metrics to include external stakeholder perspectives in assessing the effectiveness of GHRM strategies.

There is also a notable gap in the study of GHRM within SMEs and nonprofit organizations. Most research continues to focus on large corporations, thereby overlooking contexts that may require different approaches to resource allocation, leadership engagement, and cultural alignment in implementing sustainable HRM practices.

The emergence of sustainability reporting and ESG frameworks places new responsibilities on HR professionals to support real-time data collection, performance tracking, and compliance transparency. As such, GHRM is not only about fostering green behavior but also about institutionalizing systems of accountability and measurable impact.

This study proposes an integrative model of GHRM that links global external pressures such as the SDGs, circular economy demands, and digitalization with internal HR practices and outcomes. Through this model, we demonstrate how green HR practices contribute to innovation capacity, organizational resilience, and long-term value creation.

In conclusion, GHRM is poised to become a cornerstone of corporate sustainability strategies. Its future development depends on addressing current gaps in inclusivity, methodological robustness, and contextual sensitivity. As organizations seek to remain competitive in a rapidly evolving global landscape, GHRM offers a viable pathway for aligning human resource practices with the demands of environmental stewardship and social responsibility.

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