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The Strategic Role of Human Resources in Green Industry: Conceptual Integration between ESG Principles and Green HRM Practices

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ABSTRACT

The accelerating transition toward sustainable industries demands strategic human resource management that integrates Environmental, Social, and Governance (ESG) principles with Green Human Resource Management (GHRM) practices. Despite global recognition, conceptual and operational integration between ESG and GHRM remains limited, particularly in Asia, where adoption rates and standardized performance indicators are still low. This study aims to identify and map international publication trends, thematic structures, and research gaps in ESG–GHRM integration, while proposing a conceptual framework to guide future research and practice. Employing a systematic literature review (SLR) guided by the PRISMA 2020 protocol and supported by bibliometric analysis using VOSviewer, the study synthesizes findings from 26 peer-reviewed articles published between 2020 and 2025, retrieved from Scopus, ScienceDirect, and Google Scholar. The bibliometric mapping reveals five dominant thematic clusters: green recruitment, green training, green performance appraisal, pro-environmental employee behavior, and ESG-linked sustainability performance. Emerging research directions include the role of green transformational leadership, digital transformation in sustainable HRM, and culturally grounded leadership models such as Mo'odelo Leadership. Findings indicate that strong GHRM adoption correlates positively with environmental commitment, organizational adaptability, and innovation in sustainability practices. However, research gaps remain in addressing the social and governance dimensions of ESG, developing standardized measurement frameworks, and expanding studies to underrepresented regions such as Southeast Asia. The study contributes to theory by providing evidence-based recommendations for aligning HR policies with sustainability goals. These insights hold significant implications for policymakers, industry leaders, and scholars in fostering resilient, ethically governed, and environmentally responsible organizations

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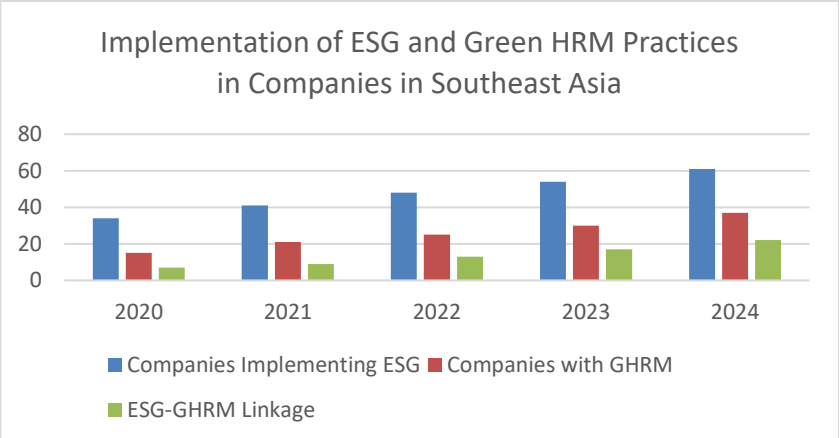
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INTRODUCTION

Industrial sustainability has emerged as a central focus amid global pressures stemming from environmental crises and social inequality. In this context, the principles of Environmental, Social, and Governance (ESG) have become a dominant framework for evaluating corporate sustainability. Meanwhile, the transformation toward a green industry requires a comprehensive internal strategy, particularly in human resource management. Green Human Resource Management (Green HRM) represents an adaptation of conventional HR practices by embedding environmental principles into recruitment, training, and performance management. Consequently, the need for human resources to play a strategic role in integrating ESG values into organizational culture has become increasingly urgent (Rahman, 2025).

ESG is no longer an optional trend but a global accountability framework that measures an organization's success in managing environmental and social risks. According to McKinsey, (2022), more than 70% of global investors now consider ESG scores in their decision-making, compelling companies to ensure that human resource practices contribute directly and strategically to achieving these scores. Furthermore, research by KPMG, (2023) reported that companies embedding ESG into their HR management systems experienced a 14% increase in productivity within two years, reflecting the tangible impact of integrated sustainability on business performance.

This study is particularly relevant to the broader discourse in governance, taxation, and auditing within the framework of community service, as the integration of ESG principles into Green HRM practices inherently intersects with corporate governance mechanisms, regulatory compliance, and accountability standards. By embedding sustainability into human resource policies, organizations not only enhance environmental and social performance but also strengthen governance structures that are essential for transparent reporting, fiscal responsibility, and ethical auditing practices. The paucity of research examining ESG–GHRM integration from this multidimensional perspective—linking human resource strategies to governance and accountability outcomes—presents a clear research gap. Addressing this gap requires a focused investigation into how such integration can be conceptualized, implemented, and evaluated in diverse organizational contexts, thereby ensuring its practical significance and scientific contribution.



Sources: adopted from (KPMG, 2023; Malinis & Tan, 2025)

Figure 1. Implementation of ESG-GHRM in South East Asia

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Green Human Resource Management (Green HRM) practices play a direct role in enhancing corporate environmental performance, including within the manufacturing and service sectors. Furthermore, the relationship between Green HRM and supply chain performance can be strengthened through organizational learning (Muafi & Kusumawati, 2021; Sakharina et al., 2020). In addition, Novianti & Rumijati, (2023) and and Suharti & Sugiarto, (2020) found that pro-environmental behavior serves as a critical mediating factor in fostering organizational sustainability. This evidence underscores that sustainability is not merely rhetorical but translates into tangible outcomes.

Nevertheless, a substantial research gap remains in elucidating how the integration of ESG (Environmental, Social, and Governance) principles and Green HRM can be developed within a conceptual framework and operationalized in practice. Most existing literature focuses on ESG or Green HRM as separate domains, rather than integrating both into a comprehensive HRM strategy. The absence of clear policy guidelines and standardized evaluation metrics makes it challenging for companies to assess the effectiveness of ESG–HRM integration. KPMG (2023) reported that 56% of companies in Asia lack HR indicators directly linked to ESG objectives, resulting in an implementation gap between central policies and employee-level practices.

In the Indonesian context, the transition toward a green economy has been embedded within the National Medium-Term Development Plan (RPJMN) 2020–2024, with the government targeting a 29% reduction in emission intensity by 2030, in which the role of industry is critical. However, no strategic HR approach has yet been incorporated into the national green policy framework (KLKH, 2023).

Table 1. Contribution of Green HRM Practices to Corporate ESG Indicators

Green HRM Practice	Impact on ESG Indicators	Example of Implementation
Green-Oriented Recruitment	Improves Environmental (E) Score	Prioritizing candidates with environmental certification
Training & Development	Strengthens Social (S) through sustainability literacy	Workshops on reducing employees' carbon footprint
Environmental Performance Reward	Encourages Governance (G) based on transparency and incentives	Bonuses for teams achieving the best energy savings
Green Performance Appraisal	Enhances ESG integration into the HR evaluation system	Assigning environmental responsibilities
Green Employee Engagement	Promotes a green organizational culture and increases employee well-being	Green initiative teams and sustainability committees

Source: Adopted from (Lin & Lin, 2025)

However, internal resistance and limited ESG literacy at the managerial level often hinder effective implementation (Lin & Lin, 2025). Therefore, training strategies and competency development aligned with sustainability should be prioritized. Human resources in green industries must be positioned as change agents who drive innovation and green behavior, rather than merely functioning as operational executors. Amid the transition toward green industry, human resource readiness depends not only on technical expertise but also on psychological factors such as self-efficacy (Podungge et al., 2023). Moreover, local values, such as the mo'odelo leadership philosophy in Gorontalo, can embody ESG principles by strengthening the self-efficacy and psychological resilience of human resources—critical for ensuring that sustainability values are internalized and effectively operationalized in the workplace (Podungge & Bokingo, 2021).

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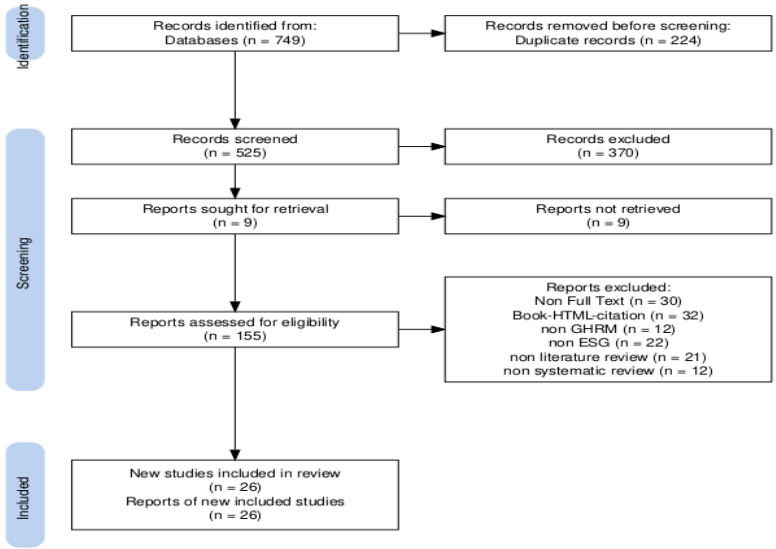
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The integration of ESG and Green HRM has the potential to create organizational ecosystems that are more adaptive, collaborative, and globally competitive. Accordingly, this study offers a significant contribution in filling the conceptual gap by developing an ESG–Green HRM integration framework that can be adopted across sectors. Given the urgency of exploring and formulating strategic HRM approaches grounded in ESG and Green HRM, such research is essential to address both conceptual and practical challenges in supporting industrial sustainability through the transformative role of human resource management.

METHODS

This study employed a Systematic Literature Review (SLR) approach, structured according to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) 2020 protocol, to ensure methodological transparency and replicability (Page et al., 2021). The research design was qualitative, utilizing secondary data from peer-reviewed journal articles published between 2020 and 2025 in Scopus, ScienceDirect, and Google Scholar databases. Search queries combined keywords such as "Green Human Resource Management", "ESG integration", "sustainable HRM", and "green industry" applied to titles, abstracts, and keywords.

The article selection process began with 749 records, of which 224 duplicates were removed. The remaining 525 records underwent title and abstract screening, resulting in the exclusion of 370 records for irrelevance to ESG–GHRM integration. Nine reports could not be retrieved, leaving 155 articles for full-text eligibility assessment. In this stage, 129 articles were excluded for reasons including non-full text (n = 30), book or HTML citations (n = 32), non-GHRM focus (n = 12), non-ESG focus (n = 22), non-literature review (n = 21), and non-systematic review (n = 12). Consequently, 26 studies met all inclusion criteria and were retained for analysis.



Sources: Authors' own work (2025)

Figure 2. PRISMA Diagram Flow

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Bibliometric mapping was conducted using VOSviewer because of its advanced capabilities in visualizing scientific networks, enabling the identification of publication trends, co-authorship relationships, keyword co-occurrences, and thematic clusters within the ESG–GHRM research domain. The synthesis of the 26 selected articles was carried out using an inductive thematic analysis approach to extract major themes, identify conceptual and empirical gaps, and propose an integrative ESG–GHRM framework. This process aimed to strengthen the theoretical foundation of sustainable human resource management while offering practical insights for organizations seeking to align HR strategies with ESG principles.

Ethical considerations were upheld by citing all data sources appropriately and maintaining academic integrity in data handling, analysis, and reporting.

RESULT AND DISCUSSIONS

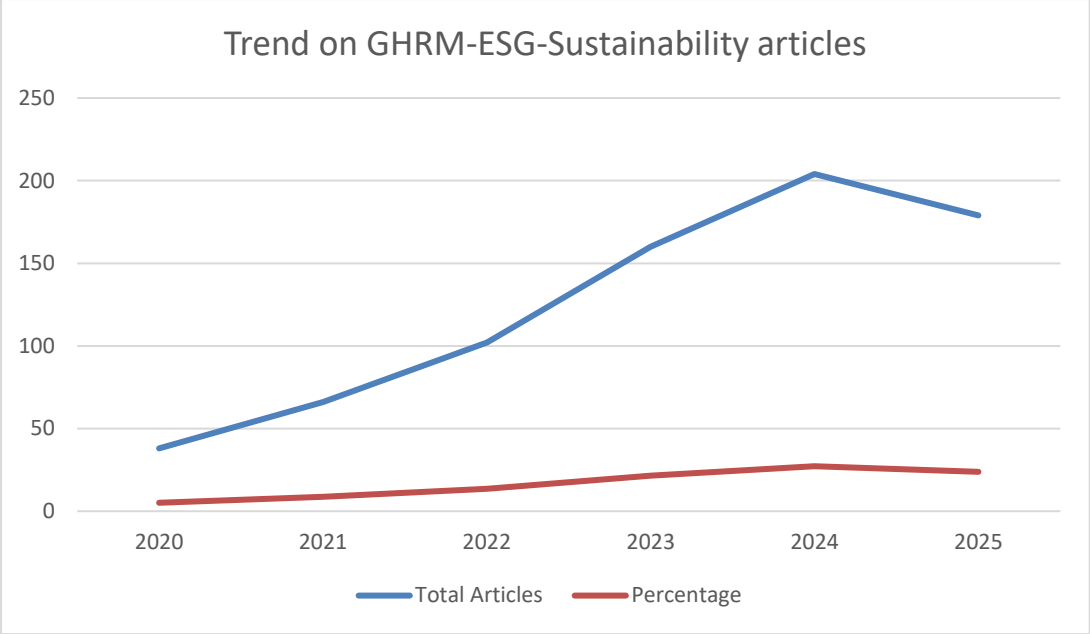
The findings of this study are presented in three complementary dimensions, trends, bibliometric analysis, and thematic synthesis—derived from the systematic review of 26 selected articles. The bibliometric mapping provides a quantitative overview of research trends, authorship networks, and thematic clusters in the integration of Environmental, Social, and Governance (ESG) principles with Green Human Resource Management (GHRM) practices. This is followed by a thematic synthesis that qualitatively distills the key concepts, practical implications, and research gaps emerging from the literature. Together, these analytical approaches offer both breadth and depth, enabling a comprehensive understanding of the current state of research and laying the groundwork for addressing the study's guiding questions.

1. International publication trends regarding the integration of Green Human Resource Management (Green HRM) and Environmental, Social, and Governance (ESG) principles?

Given that GHRM and ESG are evolving multidisciplinary fields, it is essential to understand their developmental dynamics from both temporal (chronological) and substantive (thematic and key issues) perspectives. Since 2020, attention to the integration of sustainability principles into human resource management has risen sharply, driven by global pressures on environmental, social, and corporate governance accountability, as well as the post–COVID-19 recovery that has stimulated innovation and organizational resilience grounded in sustainability values. This literature exploration serves as the foundation for constructing a research map that not only illustrates the scholarly trajectory but also informs evidence-based decision-making by policymakers and organizational leaders.

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Figure 3. Trends on articles

The development of GHRM–ESG literature has shown a significant increase over the past five years, in line with global pressures to integrate sustainability principles into organizational management instruments. Prior to 2020, discussions on human resource management (HRM) were largely traditional, focusing on efficiency, performance, and organizational compliance with labor regulations. However, starting in 2020, attention began to shift toward green human resource management (GHRM) instruments that adapt and incorporate environmental and social considerations into HRM practices as a response to the global climate crisis.

The surge in literature during 2022 and 2023 indicates a marked growth in ESG (Environmental, Social, and Governance) research, particularly in areas such as green training, green behavior, and ESG disclosure, which are directly correlated with organizational performance (Gürsoy & Erbuğa, 2024). The linkage between GHRM and ESG has become increasingly explicit alongside a growing academic interest in the impact of organizational behavior on long-term sustainability (Bhatia, 2025).

Several articles reveal that this literature trend has evolved not only quantitatively but also conceptually, incorporating elements such as pro-environmental behavior, leadership styles, and green innovation (Jabeen et al., 2023). This marks a transition from descriptive research toward a perspective in which GHRM is no longer merely a tactical instrument but an integral component of organizational strategy to achieve the Sustainable Development Goals (Delgado-Ceballos et al., 2023).

2. The Thematic structure and developmental trajectory of research integrating ESG principles into Green HRM practices based on bibliometric visualization.

In recent years, academic attention toward the integration of Environmental, Social, and Governance (ESG) principles into Green Human Resource Management (GHRM) practices has increased significantly. Bibliometric visualization of the scientific literature indicates a shift in research

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orientation from merely exploring individual green concepts to adopting a more strategic and integrated approach. GHRM is no longer perceived as a mere collection of environmentally friendly practices but is increasingly conceptualized as a managerial framework embedded with ESG values to shape sustainable organizational systems. The collaboration among environmental, social, and governance dimensions in human resource management practices has also given rise to emerging themes such as green transformational leadership, green work engagement, and employee involvement in green innovation guided by principles of ethical governance (Delgado-Ceballos et al., 2023).

The bibliometric findings further reveal a strong pattern of interconnectedness between GHRM and ESG factors, reflected through the frequent use of keywords such as green behavior, environmental commitment, and sustainability reporting. Articles identified as central nodes in the bibliographic network display a tendency toward more holistic examinations, wherein pro-environmental employee behavior and ESG-based reward systems are integrated into overall business strategies. This approach reinforces the understanding that the effectiveness of GHRM in supporting organizational sustainability depends not only on technical policies but also on the cultural structures of the organization and leadership dynamics that are adaptive to social and environmental pressures (Carballo-Penela et al., 2023).

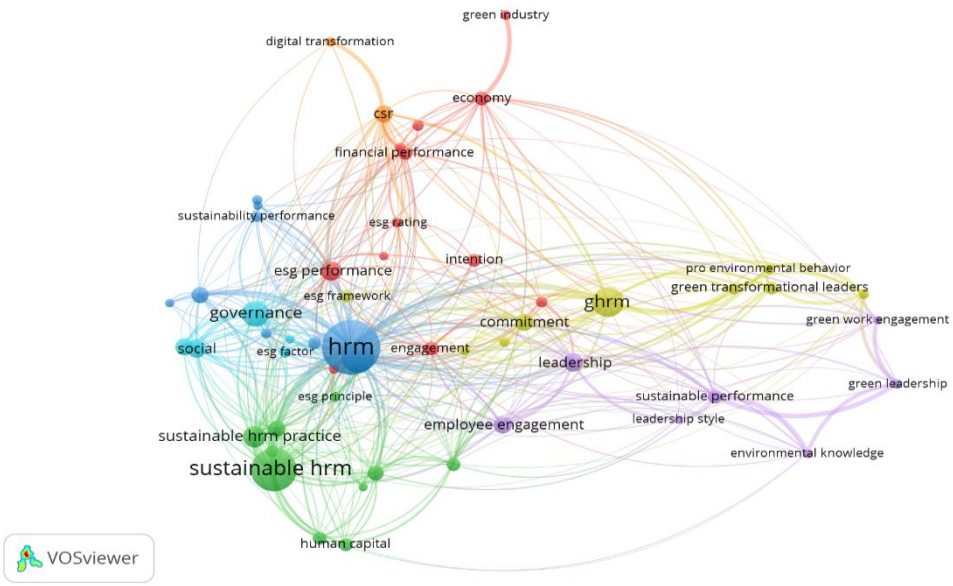


Figure 4. Thematic and Keyword Distribution

The bibliometric visualization generated using VOSviewer illustrates the thematic structure and conceptual interconnections within the literature on Green Human Resource Management (GHRM) integrated with Environmental, Social, and Governance (ESG) principles. Derived from an analysis of more than 700 scholarly articles, the visualization reveals the complexity and evolution of concepts in the GHRM–ESG domain. Each color group represents a thematic cluster, reflecting the strength of relationships among keywords that frequently co-occur in recent academic publications.

At the center of the visualization, the term "HRM" appears as a dominant node, functioning as a hub that connects various strategic themes such as governance, sustainable HRM, employee engagement, and green transformational leadership. For instance, the blue cluster depicts the linkages between governance, ESG performance, and sustainability performance—an essential focus in assessing the contribution of GHRM to ESG objectives (Delgado-Ceballos et al., 2023). The green

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cluster highlights the strengthening of concepts related to sustainable HRM practices and human capital, emphasizing the importance of organizational investment in sustainability-oriented human resources (Mariappanadar, 2024; Ragazou et al., 2024; Zournatzidou et al., 2025).

Meanwhile, the purple cluster, containing terms such as green work engagement, environmental knowledge, and sustainable performance, reflects research focusing on integrating pro-environmental behavior with overall organizational performance, including employees' emotional and cognitive engagement in embodying green values (Bangwal et al., 2025; Papademetriou et al., 2023, 2025). In contrast, the yellow cluster depicts the close relationship between GHRM, commitment, and green transformational leadership, underscoring how green management practices can influence individual motivation and commitment toward sustainability values (Abourokbah et al., 2024; Bangwal et al., 2025).

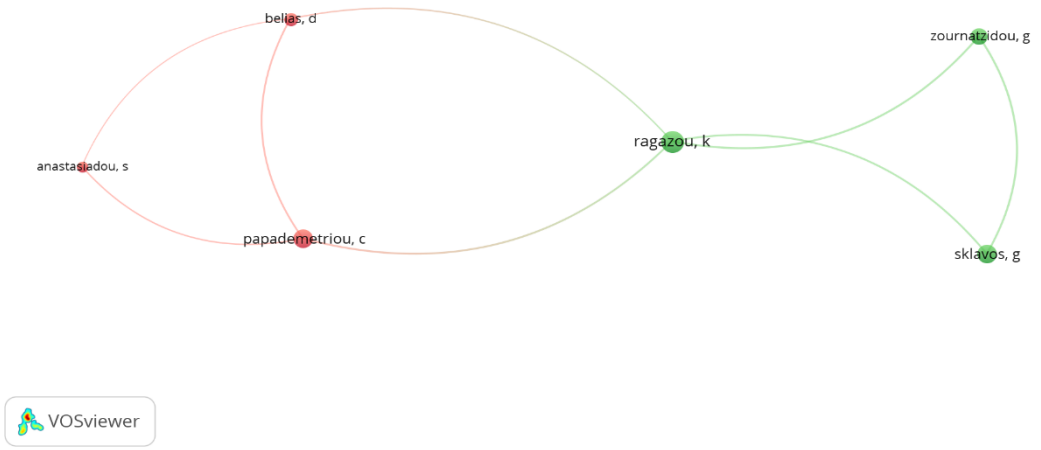
A notable finding in this bibliometric visualization is the emergence of terms such as CSR, digital transformation, and financial performance in the orange cluster, signaling that GHRM practices are increasingly associated with broader corporate agendas, including corporate social responsibility and digital transformation to support sustainable management (Shamshuddin et al., 2025). This is reinforced by the interconnection of keywords such as ESG rating, ESG framework, and intention, indicating that organizations are now embedding GHRM practices into strategic decision-making processes to create measurable social, environmental, and economic value (Gazi et al., 2025). Furthermore, the linkage between digital transformation and green industry in the visualization suggests emerging opportunities for future research. Digital transformation has the potential to act as a catalyst for accelerating the adoption of technology-based GHRM practices, such as the use of artificial intelligence in green recruitment processes, online platforms for sustainable training, and real-time data-based ESG monitoring systems. This opens pathways for developing concepts such as green digital leadership and fostering an organizational culture that is adaptive to green innovation in the digital era (Delgado-Ceballos et al., 2023).

Overall, the visual map affirms that the integration of GHRM and ESG is not merely symbolic but is evolving toward systemic interconnections that encompass behavioral, structural, and performance dimensions within organizations. Consequently, the current body of literature supports the notion that GHRM serves as a key pillar in operationalizing ESG principles and achieving long-term sustainability goals.

In bibliometric studies, co-authorship analysis is an important approach for understanding how scientific knowledge is collectively developed within a particular field of inquiry. Such visualizations allow the identification of collaboration patterns, interconnected research groups, and key actors who play a strategic role in disseminating core ideas. In the context of GHRM–ESG integration, co-authorship analysis offers insights into the social dynamics of scholarly production—revealing who collaborates with whom, the extent of such collaborations, and how these networks contribute to advancing literature focused on organizational sustainability. The following visualization presents a map of author collaborations based on the dataset of articles analyzed in this study.

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Sources: Authors' own work (2025)

Figure 5. Authors linkage

In this visualization, two main author groups are evident, forming two distinct color-coded clusters. The red cluster on the left comprises authors such as Anastasiadou, Belias, and Papademetriou, who appear to form a strongly interconnected collaborative network. Their contributions are likely concentrated on conceptual or region-specific studies focusing on the development of GHRM from organizational and human resource policy perspectives, particularly within social and institutional contexts. Conversely, the green cluster on the right includes authors such as Ragazou, Sklavos, and Zournatzidou, who also display intense collaborative relationships in other publications and are likely to have a more applied research focus, particularly on the implementation of GHRM in industrial sectors or applied case studies related to ESG.

Interestingly, the Ragazou node appears to serve as a bridge between the two clusters, forming a type of cross-group collaborative link. Such a role is significant in the academic domain, as it suggests that the author maintains collaborative networks that span traditionally separate research groups. Scholars in such bridging positions often play a pivotal role in integrating diverse theoretical and methodological approaches, thereby facilitating the cross-disciplinary convergence of themes—for instance, connecting the technical dimensions of GHRM with ESG evaluation frameworks.

Overall, this map indicates that research on GHRM and ESG is still developing through relatively limited collaborative networks, fragmented into several small, specialized groups. This pattern suggests potential opportunities for expanding international and multidisciplinary collaboration to enrich understanding and strengthen the conceptual frameworks in this field. Strengthening author networks across different countries, sectors, and methodological orientations in the future could foster the emergence of more comprehensive syntheses, with greater impact on sustainability practices and human resource management.

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3. Research Synthesis

As the foundation for developing a systematic synthesis, the following article table presents a summary of the core information from the 26 scholarly articles analyzed in this study. Each entry includes the title, author(s), year of publication, and source of publication. This table serves not only as the initial documentation of the systematic literature review (SLR) process but also as the basis for thematic analysis and bibliometric mapping, thereby enabling a more comprehensive and structured exploration of the development of Green Human Resource Management (GHRM) research and its integration with Environmental, Social, and Governance (ESG) principles.

Table 2. Synthesized Articles

No	Title	Author	Year
1	Growing a greener future: A bibliometric analysis of green innovation in SMEs	(Sabando-Vera et al.,)	2025
2	Leadership styles and sustainable performance: A systematic literature review	(Piwowar-Sulej & Iqbal)	2023
3	Emerging green industry toward net-zero economy: A systematic review	(Nyangchak)	2022
4	Does green HR management attention foster sustainability? A quantile-based analysis	(Alruwaili)	2024
5	Innovation and human resource management: a systematic literature review	(Jotabá et al.,)	2022
6	The Role of Artificial Intelligence in Promoting Employee Workplace Green Behaviors: A Systematic Analysis	(Olazo & Evaristo)	2025
7	Green Human Resource Management in Islamic Finance: A Systematic Review of Sustainability Strategies in Indonesia	(Deden Suherman et al.,)	2025
8	A systematic literature review on green human resource management (GHRM): an organizational sustainability perspective	(Miah et al.,)	2024
9	Companies' Bottom Lines Are Affected by ESG Factors: A Bibliometric Study	(Thirunavukkarasu & Kiran Kumar Thoti)	2023
10	Greener Future for HR: A Comprehensive Review of Green HRM Practices in its Functions in Global Industrial Sectors	(Sarada & Mamata)	2024
11	Green Human Resource Management and Corporate Social Responsibility for a Sustainable Environment: A Bibliometric Review	(Aytekin)	2021
12	Past Trends and Future Directions in Green Human Resource Management Research: A Bibliometric Analysis	(Sungaile & Stankeviciene)	2024
13	Systematic Literature Review: Green Innovation and Sustainable Strategic	(Aprianti & Heksarini)	2025

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14	Bibliometric analysis of research trends in Green Human Resource Management and sustainable development	(Pooja & Bhavani)	2025
15	High-performance Sustainable Work Practices for Corporate ESG Outcomes: Sustainable HRM Perspective	(Makhecha & Mariappanadar)	2023
16	Leading radiography managers into a greener future: A systematic review of green transformational leadership and sustainable practices	(Federico et al.,)	2025
17	Green Human Resource Management and Its Implications on Organizational Performance	(Chowdhury et al.,)	2025
18	Green Human Resource Management and Organizational Performance: A Systematic Review	(Lawter & Garnjost,)	2025
19	The Contribution of Intelligent HRM to Corporate Sustainability: A Systematic Literature Review	(Barghini)	2024
20	Sustainable Strategic HRM: Fostering Environmental Ethics in Organizations	(Gürsoy & Erbuğa)	2024
21	Green Human Resource Management Practices - Implementation in Indian Higher Educational Institutions: A Conceptual Study	(Ms et al.,)	2025
22	Unraveling the Literature on Green Banking and SDGs: A Bibliometric Analysis	(Candera et al.,)	2025
23	The Lock-In Effect on ESG and Business Performance Relationship: A Critical Examination and Meta-Analysis	(Mendonça et al.,)	2025
24	Connecting the Sustainable Development Goals to firm-level sustainability and ESG factors: The need for double materiality	(Delgado-Ceballos et al.,)	2022
25	Green and non-green outcomes of green human resource management (GHRM) in the tourism context	(Tandon et al.,)	2023
26	Green HRM, employee pro-environmental behavior, and environmental commitment	(Bangwal et al.,)	2025

Sources: Authors' own work (2025)

The literature on Green Human Resource Management (GHRM) and its integration with Environmental, Social, and Governance (ESG) principles has experienced rapid growth over the past decade, driven by heightened organizational awareness of sustainability and increasing external pressures from stakeholders. Early studies predominantly focused on individual practices such as green training and eco-behavior; however, recent trends reveal a more holistic integration of GHRM and ESG as a strategic approach to enhancing organizational sustainability performance (Piwowar-Sulej & Iqbal, 2023). Key themes extensively explored include the role of GHRM in fostering pro-environmental behavior, enhancing employee engagement, and examining the correlation between green practices and corporate financial performance (Mendonça et al., 2025).

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From a methodological perspective, bibliometric analysis and systematic literature review approaches dominate the field, often employing tools such as VOSviewer and PRISMA. For instance, Sabando-Vera et al. (2025) successfully mapped GHRM literature trends over the past decade, identifying robust thematic clusters such as green leadership, ESG performance, and sustainability reporting. Other studies underscore that research in this area remains concentrated in Europe and South Asia, with limited empirical investigations in Southeast Asia and Africa—highlighting opportunities for future cross-geographical and cross-cultural explorations (Delgado-Ceballos et al., 2023; Nyangchak, 2022).

From a theoretical standpoint, there is a growing consensus that GHRM serves not merely as a managerial tool but also as a platform for strengthening corporate ethical governance within the ESG framework. Several studies emphasize the pivotal role of green transformational leadership in bridging organizational values and employees' environmental behaviors (Bangwal et al., 2025; Tandon et al., 2023). This transformation expands the scope of HR from operational functions to strategic domains, linking human resource policies to ESG performance indicators such as energy efficiency, emissions reduction, and social responsibility.

Nevertheless, several research gaps persist. Among these is the lack of empirical consensus on the direct influence of GHRM on the social dimension of ESG, particularly concerning social justice, diversity, and employee well-being (Gazi et al., 2025). Furthermore, few studies have evaluated the effectiveness of GHRM implementation within public sector organizations or small and medium-sized enterprises (SMEs). Additional challenges include the absence of standardized measurement indicators for assessing the success of GHRM–ESG integration and the scarcity of longitudinal research to capture long-term impacts.

The practical implications of these findings highlight the need for organizations to adopt a comprehensive GHRM approach, aligning recruitment, training, performance appraisal, and incentive systems with ESG objectives. Firms that strategically implement green HR policies tend to achieve higher levels of employee engagement and more favorable public perceptions regarding their social responsibility (Ragazou et al., 2024; Sklavos et al., 2025). It is also recommended that organizations establish transparent ESG reporting systems that integrate both financial and non-financial indicators to communicate sustainability performance comprehensively.

Future research directions may focus on exploring the interplay between digital transformation and GHRM, such as the application of big data, artificial intelligence, and green information systems in supporting sustainable HR practices. Emerging keywords in the literature include green digital leadership, digital ESG reporting, and HR analytics for sustainability—areas that remain underexplored but hold significant potential for advancement. Additionally, cross-national, cross-sectoral, and mixed-method comparative studies could enrich understanding of the effectiveness of GHRM–ESG implementation in diverse contexts.

With the mounting global demand for corporate environmental and social accountability, integrating GHRM and ESG is no longer a discretionary choice but a strategic imperative. Accordingly, the development of integrative theoretical models that explain the causal and dynamic relationships among GHRM, organizational culture, and ESG outcomes is an urgent necessity. Future research should aim not only to address the "what" and "how" but also the "why" behind the role of GHRM as a key driver in shaping sustainable and resilient organizations of the future.

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