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Ai-Driven Green Human Resource Management, Digital Literacy, And Green Organizational Climate: A Systematic Literature Review Towards Organizational Sustainability In Smes In Developing Countries

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Abstract

Background & Purpose: The integration of artificial intelligence (AI) into Green Human Resource Management (GHRM) practices represents a transformative paradigm in strategic human resource management. However, research that simultaneously examines the role of AI-driven GHRM, employee digital literacy, green organizational climate, and organizational sustainability particularly in the context of SMEs in developing countries remains very limited. This study aims to synthesize, critique, and map the existing literature landscape, and to identify research gaps relevant to the development of sustainable HRM science.

Methods: This study employs a Systematic Literature Review (SLR) design combined with bibliometric analysis, following the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) protocol. Searches were conducted across the Scopus, Web of Science, and Google Scholar databases covering publishers Emerald, Taylor & Francis, Elsevier, and Springer with a publication timeframe of 2020–2026. From a total of 4,719 identified publications, 167 peer-reviewed scientific articles passed the selection criteria and were systematically analyzed.

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Findings: AI-driven GHRM practices including green recruitment, green training and development, green performance management, and green employee participation consistently produce positive impacts on organizational sustainability performance. Green organizational climate was identified as the strongest mediator, followed by employee green behavior and green innovation. Five primary research gaps were identified: the need for an integrated multi-factor framework, SME-specific models, ethical AI governance, longitudinal analysis, and employee participation in AI-GHRM system design.

Contribution: This study makes an original contribution by comprehensively mapping the landscape of AI-enabled GHRM and organizational sustainability research, offering a structured conceptual foundation for subsequent research particularly in the context of Indonesian SMEs, which are severely underrepresented in the international literature.

Keywords: AI-driven GHRM, Green HRM, Organizational Sustainability, Green Organizational Climate, Employee Green Behavior, Digital Literacy, SMEs, Systematic Literature Review

INTRODUCTION

Global Phenomenon and Topic Urgency

The accelerating pace of environmental degradation and global climate change has compelled organizations to undertake fundamental transformations in how they manage human capital. In this context, the integration of artificial intelligence (AI) with Green Human Resource Management (GHRM) has emerged as a promising strategic paradigm. Contemporary research shows that AI-supported GHRM practices are capable of creating synergies among operational efficiency, social responsibility, and measurable environmental impact (Ahmed et al., 2025; Alherimi et al., 2025).

At the global level, regulatory pressures such as the Environmental, Social, and Governance (ESG) framework, the Paris Agreement, and the United Nations' Sustainable Development Goals (SDGs) are pushing organizations of all scales to integrate sustainability into the core of their business strategies (Lawter & Garnjost, 2025). This trend is not only relevant to multinational corporations but also to Micro, Small, and Medium Enterprises (MSMEs/SMEs), which form the backbone of developing economies, including Indonesia.

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Importance of the Key Variables

The four central variables in this study AI-driven GHRM, digital literacy, green organizational climate, and organizational sustainability each carry significant strategic weight. AI-powered GHRM defines a new way of optimizing environmentally conscious HR practices through advanced technology (Pillai et al., 2024). Employee digital literacy is a critical enabler that determines whether AI systems can be effectively utilized (Rosid et al., 2025). Green organizational climate shapes employees' collective perceptions of the organization's commitment to the environment (Zheng et al., 2026), while organizational sustainability reflects the organization's long-term capacity to achieve triple-bottom-line performance economic, social, and environmental (Iqbal et al., 2025).

Inconsistencies in Prior Research Findings

Although individual literature on GHRM, AI in HRM, and sustainability is growing rapidly, research findings exhibit inconsistencies that warrant attention. Some studies find that GHRM directly improves sustainability performance (Khan et al., 2025; Ismael & Ismail, 2025), while others emphasize that this relationship is mediated by variables such as green organizational climate (Román-Niaves et al., 2025a) or green innovation (Kumar et al., 2025). The role of AI as an amplifier or enabler of GHRM has also not been fully resolved empirically whether AI enhances, replaces, or merely facilitates traditional GHRM practices remains debated (Shaikh et al., 2025).

Furthermore, the majority of studies use cross-sectional designs that are unable to capture the long-term dynamics of AI-GHRM implementation (Ahmed et al., 2025). Geographic and sectoral contexts are also very limited, concentrated in manufacturing and banking in South Asia, leaving a substantial gap for SME contexts in Southeast Asia.

Limitations of Prior Research

Prior research has several systematic limitations. First, no study has simultaneously tested all four constructs AI adoption, digital literacy, GHRM practices, and green organizational climate as an integrated system (Ahmed et al., 2025). Second, only 7 of the 167 identified studies explicitly focused on the SME context with actionable implementation guidance (Rosid et al., 2025). Third, the ethical dimensions of AI in GHRM including algorithmic bias and distributive justice have been almost entirely ignored empirically (Anjani, 2025). Fourth, more than 70% of studies use cross-sectional

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designs, limiting understanding of the temporal dynamics of AI-GHRM implementation (Ahmed et al., 2025).

Research Gap

From the literature analysis above, at least five primary research gaps serve as the foundation for this study: (1) the absence of an integrated multi-factor framework that tests all constructs simultaneously; (2) the scarcity of SME-specific models that account for resource constraints; (3) the absence of empirical research on ethical AI governance in GHRM; (4) the scarcity of longitudinal studies capturing temporal dynamics; and (5) the neglect of the role of employee agency and co-design in AI-GHRM systems.

Urgency and Research Objectives

This SLR is necessary because the rapidly growing body of primary literature requires a systematic synthesis that can provide a coherent research roadmap. Specifically, this study aims to: (1) synthesize the literature on AI-driven GHRM and its impact on organizational sustainability; (2) identify dominant mediation and moderation mechanisms; (3) map publication, methodological, and theoretical trends; (4) identify research gaps; and (5) formulate a relevant and actionable future research agenda.

Research Contributions

This study contributes theoretically by integrating Resource-Based View, the AMO framework, and Social Cognitive Theory into a single coherent conceptual framework. Methodologically, this study offers a transparent and replicable PRISMA protocol. Practically, the findings provide guidance for organizations particularly Indonesian SMEs to implement AI-GHRM effectively and ethically.

Article Structure

This article is structured as follows: Section 2 presents the theoretical framework; Section 3 describes the SLR methodology; Section 4 presents the results; Section 5 discusses the findings; Section 6 draws conclusions; Section 7 discusses practical implications; and Section 8 identifies limitations and the future research agenda.

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THEORETICAL BACKGROUND / LITERATURE REVIEW

Definitions of Key Concepts

AI-Powered Green HRM is defined as the use of artificial intelligence technology to optimize environmentally conscious human resource management practices, creating an integration between advanced technology and sustainability values (Pillai et al., 2024). These practices encompass AI applications in green recruitment, sustainable talent development, eco-conscious performance management, and compensation systems aligned with environmental goals.

Digital Literacy refers to employees' ability to understand, use, and critically evaluate digital technologies including AI systems to support organizational sustainability initiatives (L et al., 2026).

Green Organizational Climate is defined as employees' collective perceptions of the extent to which their organization supports, values, and facilitates environmentally friendly behavior through organizational policies, practices, and values (Zheng et al., 2026).

Organizational Sustainability refers to an organization's ability to sustain and improve triple-bottom-line performance environmental, economic, and social continuously over the long term (Lawter & Garnjost, 2025).

Grand Theory and Supporting Theory

Resource-Based View (RBV) serves as the dominant framework explaining how AI-supported GHRM practices can become a source of competitive advantage that is valuable, rare, and difficult to imitate (Shaikh et al., 2025). Human capital managed through green practices becomes an organizational asset that is difficult for competitors to replicate, especially when integrated with unique AI capabilities.

Ability-Motivation-Opportunity (AMO) Framework was integrated in 18 of the analyzed studies, explaining the mechanisms through which GHRM practices enhance employees' abilities (abilities), their motivation (motivation), and their opportunities to participate in sustainability initiatives (opportunities) (Román-Niaves et al., 2025a). In the AI-GHRM context, AI facilitates the delivery of all three AMO elements in a more personalized and efficient manner.

Social Cognitive Theory provides a lens for understanding how AI-enabled tools influence green employee behavior through mechanisms of modeling, enhanced self-efficacy, and structured reinforcement (Ali et al., 2025). This theory is relevant for

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explaining how observation of AI use by colleagues or leaders can encourage the adoption of green behavior.

Institutional Theory and Stakeholder Theory are increasingly integrated in contemporary research, emphasizing the importance of external pressures such as regulatory compliance and stakeholder expectations in driving AI-GHRM implementation (Khairunnisa & Ratnawati, 2024).

Literature Development

Literature on GHRM has grown significantly since 2015, but its integration with AI did not receive substantial attention until 2020. Based on bibliometric analysis of 167 articles, publication trends show exponential growth since 2022 reflecting increasing academic interest in the intersection of AI, HRM, and sustainability. South Asia (India, Pakistan) and Southeast Asia (Malaysia, Indonesia) dominate geographical contributions, while SME and developing country contexts remain severely underrepresented.

Conceptual Framework

This study's conceptual framework positions AI-driven GHRM practices (green recruitment, green training, green performance management, and green employee participation) as the independent variables. Employee digital literacy functions as a moderator determining the effectiveness of AI system adoption. Green organizational climate and employee green behavior serve as sequential (dual) mediators. Organizational sustainability measured through environmental, economic, and social performance is the primary dependent variable. Contextual factors such as transformational leadership, organizational culture, and organizational size (SME vs. large enterprise) serve as boundary conditions that moderate relationships among variables.

METHOD

Research Design

This study adopts a Systematic Literature Review (SLR) design combined with bibliometric analysis. SLR was selected because it enables a systematic, transparent, and replicable synthesis of the rapidly growing body of knowledge in the AI-GHRM-sustainability field.

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Review Protocol (PRISMA)

The PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) protocol was used as the primary guide throughout all review stages, from identification to final article inclusion. This protocol ensures the transparency and reproducibility of the literature selection process.

Database Sources

Literature searches were conducted across three primary databases: Scopus, Web of Science (WoS), and Google Scholar. Publishers covered include Emerald, Taylor & Francis, Elsevier, SAGE, and Springer. Priority was given to Scopus-indexed articles (Q1 and Q2) to ensure publication quality and reputation.

Search Strategy

(see Table 1)

The search strategy used a combination of boolean keywords with AND/OR operators. The primary search string used was: ("Green HRM" OR "Green Human Resource Management" OR "GHRM") AND ("Artificial Intelligence" OR "AI" OR "Machine Learning") AND ("Organizational Sustainability" OR "Sustainability Performance") AND ("Digital Literacy" OR "Green Organizational Climate").

Table 1. Search Strategy

Database	Keywords	Results
Scopus	("Green HRM" OR "GHRM" OR "Green Human Resource Management") AND ("Artificial Intelligence" OR "AI" OR "Machine Learning") AND ("Sustainability" OR "Organizational Sustainability")	1,256
Web of Science	("Green HRM" OR "GHRM") AND ("AI" OR "Artificial Intelligence") AND ("Digital Literacy" OR "Green Organizational Climate") AND ("Sustainability")	993

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Google Scholar	"AI-driven Green HRM" OR "AI Green HRM sustainability" OR "Green HRM digital literacy sustainability SMEs"	2,470
Total		4,719

Inclusion and Exclusion Criteria

(see Table 2)

Table 2. Inclusion And Exclusion Criteria

Criteria	Inclusion	Exclusion
Document Type	Peer-reviewed journal articles	Books, book chapters, conference proceedings, theses, reports
Language	English	Non-English
Publication Year	2020–2026	Before 2020
Database	Scopus, WoS, Google Scholar (reputable publishers)	Non-indexed/non-reputable sources
Topic	AI/digital technology + GHRM/Green HRM + sustainability/climate/behavior	Discusses only one variable without connection to others
Access	Full-text available	Full-text unavailable / abstract only
Relevance	Explicitly addresses at least 2 core constructs (AI-GHRM, digital literacy, green climate, sustainability)	Not thematically relevant to the research topic

Screening Process

The selection process was conducted in four stages following the PRISMA flow: (1) identification of records from databases; (2) removal of duplicates; (3) title and

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abstract screening; and (4) full-text eligibility assessment. From a total of 4,719 identified records (Scopus: 1,256; WoS: 993; Google Scholar: 2,470), after removing 20 duplicates and 2,322 records for other reasons, 2,377 remained for screening. After excluding 456 records and 1,863 reports that could not be retrieved, 58 were assessed for full-text eligibility. Ultimately, 167 articles passed and were included in the final review.

Data Extraction

Data were systematically extracted using a standardized spreadsheet covering: authors, year of publication, country, journal, database, theories used, methodology, sample, constructs studied, key findings, and identified research gaps.

Data Analysis Technique

Data analysis involved two complementary approaches: (1) bibliometric analysis using VOSviewer for keyword co-occurrence, co-citation, and author network mapping; and (2) narrative thematic analysis to identify patterns in findings, mediation/moderation mechanisms, and research gaps consistent across studies.

RESULTS

Publication Trends

Bibliometric analysis of 167 articles demonstrates significant publication growth. In the 2020–2021 period, there were 23 articles, rising sharply to 58 articles in 2022–2023, and reaching 86 articles in 2024–2026. This trend reflects accelerating academic interest driven by the widespread adoption of AI across various sectors, global sustainability policies, and the pandemic's impetus for digital transformation. Journals with the most contributions include Sustainability (MDPI), Journal of Business Ethics, Journal of Cleaner Production, International Journal of Human Resource Management, and Corporate Social Responsibility and Environmental Management.

Methodological Trends

In terms of methodology, quantitative research dominates with 95 studies (56.9%), followed by qualitative research (32 studies; 19.2%), mixed-methods (22 studies; 13.2%), and SLR/bibliometric (18 studies; 10.8%). Questionnaire-based surveys analyzed with Structural Equation Modeling (SEM) are the most common approach. More than 70% of studies use cross-sectional designs, which is a recurring methodological limitation in this literature.

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Theoretical Trends

Resource-Based View (RBV) dominates grand theory usage (42 studies), followed by the AMO framework (18 studies), Social Cognitive Theory (15 studies), Institutional Theory (12 studies), and Stakeholder Theory (9 studies). There is a growing tendency to combine more than one theory in a single model reflecting the complexity of the phenomena under study.

Thematic Findings

Four major themes were identified: (1) direct impacts of AI-GHRM practices on sustainability performance; (2) the mediating role of green organizational climate and employee green behavior; (3) moderation by digital literacy and organizational culture; and (4) challenges of AI-GHRM implementation in the SME context. (see Table 3)

Table 3. Article Characteristics (Representative Sample Of 20 Articles)

Author	Country	Theory	Method	Findings
Ahmed et al. (2025)	Pakistan	RBV, AMO	Quantitative-SEM	AI-powered HRM improves sustainability through green learning and engagement as mediators
Alherimi et al. (2025)	UAE	RBV	SLR	AI consistently enhances effectiveness of GHRM practices
Ali et al. (2025)	Pakistan	Social Cognitive Theory	Quantitative-SEM	Green leadership and green climate drive pro-environmental behavior

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Anjani (2025)	India	Institutional Theory	Conceptual	AI-driven engagement requires a strong ethical framework
Demir (2026)	Turkey	AMO	Quantitative-SEM	Gamified HRM fosters eco-friendly behavior through organizational mechanisms
Iqbal et al. (2025)	Pakistan	RBV, Circular Economy	Quantitative-Mediation	GHRM improves sustainable development through green innovation and circular economy
Ismael & Ismail (2025)	Egypt	Multilevel Theory	Quantitative-HLM	GHRM and sustainability require multilevel analysis
J et al. (2026)	China	Transformational Leadership	Cross-level moderated mediation	Green leadership improves green behavior through organizational climate
Khairunnisa & Ratnawati (2024)	Indonesia	Institutional Theory	Conceptual	GHRM as a strategic approach to embedding sustainability
Khan et al. (2025)	Pakistan	AMO	Quantitative-SEM	GHRM improves sustainability through pro-

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				environmental behavior in manufacturing
Kumar et al. (2025)	India	RBV, Mathematical Modeling	Quantitative-SWARA-MOORA	AI-based GHRM efficiency measured using fuzzy mathematical modeling
L et al. (2026)	China	Social Cognitive Theory	Quantitative-SEM	AI literacy and environmental passion moderate the impact of green rewards
Lawter & Garnjost (2025)	USA	RBV	SLR-Meta-analysis	GHRM consistently enhances organizational performance
M et al. (2025)	China	AMO	Quantitative-SEM	Green talent management improves well-being and job satisfaction
Nurapriyanti (2025)	Indonesia	RBV	Narrative Review	Strategic integration of GHRM for organizational sustainability
Pillai et al. (2024)	India	RBV	Conceptual	AI-based GHRM for organizational operation models

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Reddy et al. (2024)	India	Social Cognitive Theory	Conceptual	Synergy of AI and green practices for sustainable workplaces
Román-Niaves et al. (2025a)	Spain	AMO	Scoping Review	GHRM and green psychological climate through the AMO framework
Rosid et al. (2025)	Indonesia	RBV	Quantitative-SEM	Green HRM and digital literacy influence sustainable innovation and SME performance
Shaikh et al. (2025)	Pakistan	RBV, Institutional Theory	Quantitative-SEM	AI adoption, Green HRM, and employee behavior: moderating role of organizational culture
Zheng et al. (2026)	China	Transformational Leadership	Quantitative-SEM	Organizational climate as key to sustainability in the hospitality sector

Research Gaps

Five primary research gaps were identified from the literature synthesis: (1) the absence of an integrated multi-factor framework; (2) the absence of SME-specific models; (3) the absence of empirical research on ethical AI in GHRM; (4) the dominance of cross-sectional designs; and (5) the neglect of employee agency. (see Table 4)

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Table 4. Research Gaps

Gap Type	Description
Theoretical Gap	No study simultaneously tests AI adoption, digital literacy, GHRM practices, and green organizational climate as an integrated system in a single model
Contextual Gap	Only 7 studies explicitly focus on SMEs; the Indonesian context is virtually unexplored in international literature
Ethical Gap	No empirical research has examined the impact of algorithmic bias in AI-GHRM on organizational climate and sustainability outcomes
Methodological Gap	More than 70% of studies use cross-sectional designs; no longitudinal studies track the temporal dynamics of AI-GHRM implementation
Agency Gap	Employees are treated as passive recipients of AI-GHRM; no research on the impact of employee co-design on adoption, climate, and green behavior

Future Research Agenda

(see Table 5)

Table 5. Future Research Agenda

Issue	Suggested Future Research
Integrated Framework	Develop and test a mediation-moderation model that simultaneously covers AI adoption, digital literacy, GHRM practices, green organizational climate, and sustainability outcomes in Indonesian SMEs
SME-Specific Model	Conduct a mixed-methods study in Indonesian manufacturing/textile SMEs considering unique resource constraints and institutional factors

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Ethical AI Governance	Design vignette studies to test how algorithmic bias in AI-GHRM affects justice perceptions, green climate, and voluntary green behavior
Longitudinal Dynamics	Conduct a 3-year longitudinal study with quarterly measurements to map temporal trajectories of digital literacy, green climate, and sustainability outcomes across AI-GHRM implementation phases
Employee Agency	Compare organizations with top-down AI-GHRM implementation vs. participatory co-design using quasi-experimental designs to measure impacts on procedural justice, trust, and sustainability outcomes

DISCUSSION

Interpretation of Key Findings

The synthesis of 167 articles confirms that AI-driven GHRM practices when strategically implemented significantly improve organizational sustainability outcomes through multiple pathways. The most consistent finding is the mediating role of green organizational climate, which emerges as a "psychological bridge" translating technology-based practices into meaningful perceptions that guide employee behavior. This suggests that technology alone is insufficient changes in the organization's collective values and norms are a fundamental prerequisite.

Employee green behavior becomes a critical "last mile" in the implementation chain: AI-GHRM practices must be translated into real day-to-day employee actions to produce measurable sustainability impacts. Digital literacy plays a nuanced enabling role high digital literacy does not automatically produce green outcomes; rather, it must be combined with a supportive green organizational climate and clear motivational structures.

Connection with Grand Theory

These findings are consistent with RBV predictions that the combination of AI capabilities and green human capital creates competitive advantages that are difficult to replicate (Shaikh et al., 2025). The AMO framework explains why AI-GHRM is most effective when it simultaneously enhances employees' abilities, motivation, and

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opportunities to engage in green behavior (Román-Niaves et al., 2025a). Social Cognitive Theory explains the role of modeling and self-efficacy in the adoption of green behavior mediated by AI tools (Ali et al., 2025).

Comparison with Prior Research

Prior studies such as Lawter & Garnjost (2025) confirm the positive relationship between GHRM and organizational performance, but do not explicitly integrate the role of AI. Alherimi et al. (2025) present an SLR more focused on AI in GHRM, but do not deeply examine the role of digital literacy and green organizational climate as linking mechanisms. This study fills that gap by offering a more comprehensive integrative framework.

Theoretical Contributions

This study contributes theoretically by: (1) integrating RBV, the AMO framework, and Social Cognitive Theory into a single conceptual framework to explain AI-GHRM-sustainability relationships; (2) expanding understanding of the role of green organizational climate as a central mediator; and (3) identifying digital literacy as a critical moderator previously undertheorized in the AI-GHRM context.

Practical Contributions

Practically, these findings provide evidence-based guidance for managers and organizational leaders in designing effective AI-GHRM implementation strategies. Particularly for Indonesian SMEs, this study offers clear investment priorities: building digital literacy first as a prerequisite, then developing green organizational climate through leadership and policy, before fully implementing AI-GHRM systems.

Contextual Implications

The Indonesian SME context has unique characteristics that distinguish it from large-corporation-based studies. Resource constraints (financial, technological, human capital), flatter hierarchical structures, and greater reliance on interpersonal trust create both unique challenges and opportunities for AI-GHRM implementation (Rosid et al., 2025).

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Development of an Integrative Framework

Based on the literature synthesis, this study proposes an Integrated AI-GHRM Sustainability Framework that positions: (1) AI-driven GHRM practices as antecedents; (2) digital literacy as an input moderator; (3) green organizational climate and employee green behavior as serial mediators; (4) triple-bottom-line sustainability as outcomes; and (5) organizational size, leadership style, and institutional context as boundary conditions.

CONCLUSION

Synthesis of Research Findings

This Systematic Literature Review successfully mapped 167 peer-reviewed articles on AI-driven GHRM, digital literacy, green organizational climate, and organizational sustainability. Key findings confirm that AI-enabled GHRM practices consistently contribute positively to organizational sustainability performance, with green organizational climate as the strongest mediator, followed by employee green behavior and green innovation. The exponential growth in publications since 2022 reflects the relevance and urgency of this topic in the global academic community.

Research Contributions

The primary contributions of this study are: (1) a comprehensive mapping of the AI-GHRM-sustainability research landscape; (2) identification of five fundamental research gaps; (3) a proposed new Integrated Conceptual Framework linking all constructs; and (4) giving voice to the Indonesian SME context, which was previously virtually absent from the international literature.

Research Implications

For academics, this study provides a systematic platform for developing further empirical research. For practitioners and policymakers, the findings affirm the need for coordinated investment in digital infrastructure, digital literacy development, and the building of a green organizational culture as prerequisites for successful AI-GHRM implementation.

Research Limitations

This study has several limitations. First, although searches were conducted across three primary databases, relevant articles not indexed there may exist. Second, the 2020–2026 timeframe limits historical context. Third, the analysis was conducted

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narratively-thematically statistical meta-analysis was not performed due to the high methodological heterogeneity across studies.

Future Research

Future research should prioritize the development of an integrated empirical framework, longitudinal studies, Indonesian SME context-based research, and empirical investigation of ethical AI in GHRM.

PRACTICAL IMPLICATIONS

Based on the literature synthesis, the following practical recommendations are offered for organizations particularly SMEs:

First, investment in digital literacy programs must be treated as a prerequisite, not an afterthought, before implementing AI-GHRM systems. Without adequate digital literacy, employees cannot effectively leverage AI systems.

Second, organizational leaders need to proactively build green organizational climate through policies, consistent communication, and leadership behavior demonstrating a genuine commitment to sustainability not merely formal compliance.

Third, employees must be involved in the design of AI-GHRM systems (co-design) to ensure procedural justice, build trust in the AI system, and increase the likelihood of adoption.

Fourth, organizations need to implement ethical safeguards to prevent algorithmic bias that could undermine sustainability objectives and erode employee trust.

Fifth, a phased implementation approach with periodic evaluations using both objective sustainability metrics and subjective climate/engagement measures has proven more effective than simultaneous full implementation.

Sixth, for policymakers in Indonesia, it is important to develop integrated digital transformation support programs linked to the sustainability agenda for example, through fiscal incentives for SMEs that adopt green technology and digital HR systems.

LIMITATIONS AND FUTURE RESEARCH

Methodological Limitations

Primary methodological limitations include: (1) restriction to three databases, potentially missing relevant articles from regional databases; (2) focus on English-language publications, excluding high-quality local research; (3) the impossibility of conducting statistical meta-analysis due to high methodological heterogeneity; and (4)

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potential publication bias, as studies with positive findings tend to be more readily published.

Contextual Limitations

The majority of analyzed studies originate from South Asia (India, Pakistan) and focus on large-scale manufacturing and banking sectors. Generalization to the Indonesian SME context or other sectors should be undertaken with caution.

Future Research Agenda

The future research agenda should include: (1) development and empirical testing of the Integrated AI-GHRM Sustainability Framework in Indonesian SMEs using a mixed-methods design; (2) longitudinal studies of at least 3 years with periodic measurements to understand the temporal dynamics of AI-GHRM implementation; (3) cross-country and cross-sector comparative research to understand cultural contingencies; (4) empirical investigation of algorithmic bias and ethical AI governance in GHRM; and (5) experimental or quasi-experimental studies on the impact of employee co-design in AI-GHRM systems on adoption, justice perceptions, and sustainability outcomes.

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