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RESEARCH ARTICLE

GREEN HUMAN RESOURCE MANAGEMENT: PRACTICES, MECHANISMS, AND OUTCOMES A SYSTEMATIC REVIEW

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Abstract

The GHRM involves incorporating environmental goals into human resource systems to influence employee conduct and performance of the organisation. This review of the literature synthesises peer-reviewed studies (with a focus on 2020-2025) to explain what GHRM is, how it functions, and when it is the most effective. We supply a narrative synthesis of core practices and the most relevant theories (AMO, social exchange, resource-based view, and institutional perspectives) in green recruitment and selection, training and development, performance appraisal, rewards/incentives, and employee involvement using a PRISMA-guided search. Similar results are reported, confirming small to moderate positive correlations involving GHRM with pro-environmental behavior, OCB-E, environmental performance, and, by extension, financial performance. The stated mechanisms self-occur most often along the path of green psychological climate,environmental commitment/identity, and knowledge sharing; the boundary conditions include the leadership style, strategic green orientation, national culture, and industry context. We also note the fragmentation of measurement across GHRM scales, common method bias and the preponderance of cross-sectional research that limit causational insights. Future research directions will be centered on multi-level and longitudinal designs, quasi-experiments, testing scale invariance across cultures, and integrating digital HR/AI to personalise green nudges to protect against symbolic GHRM and greenwashing. We provide a synthesised process framework by which GHRM bundles relate to micro-, meso-, and macro-level outcomes through established validated mediators and moderators, and recommend reporting guidelines to enhance comparability. The review provides a guideline for the researcher and recommends best practices for stakeholders aiming to achieve congruence between people, systems and their enhanced sustainability objectives.

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Introduction:-

Organisations are beginning to realise that environmental performance is not just an issue of technology and operations but also people-how they are recruited, trained, assessed, compensated and engaged in the workplace. Green Human Resource Management (GHRM) can be defined as the purposely in-built consideration of environmental goals into HR proceedings in a manner that ensures that the organisational employees have the capacity, desire and ability to contribute towards the environmental sustainability impact (Renwick, Redman, & Maguire, 2013). Over the past 10 years of research, the trend of conceptual and empirical studies has been to understand GHRM as a set of interactively reinforcing or mutually supportive practices--normally green recruitment and selection, training and development, performance appraisal, rewards and incentives, and employee voice/involvement--as opposed to isolated components (Ren, Tang, & Jackson, 2018; Tang, Chen, Jiang, Paill, & Jia, 2018). Systematic reviews/meta-reviews also posit that such bundles induce the principal pathways in AMO theory, and are interacted with social exchange processes, resource-based capabilities and institutional pressures to influence outcomes at a variety of levels (Amrutha & Geetha, 2020; Paulet, Holland, & Morgan, 2021).

What is so special about GHRM? Why now? There are a couple of developments that make a comprehensive synthesis timely. Second, companies are shifting to performance-based environmental initiatives, something that necessitates integration of sustainability in day-to-day HR activities (Renwick et al., 2013; Ren et al., 2018). Second, quantitative reviews claim that the economic benefits of GHRM are more indirect, and that they take the form of a better environmental performance and green supply chain management (GSCM) complementarity (Carballo-Penela, Ruzo-Sanmart.n, Alvarez-Gonzalez, & Paill , 2023).

Third, focused, sectoral evidence is more mature--particularly in the hospitality, tourism, and manufacturing industries--and can be used to draw more specific inferences on mechanisms (e.g., green climate, environmental commitment/identity, knowledge sharing) and boundary conditions (e.g., leadership, national culture, environmental intensity) (Kim, Kim, Choi, &Phetvaroon, 2019; Pham, Vo-Thanh, Tuckova, & Vo, 2020; Yong et al., 2020; Tandon, D Lastly, the literature has also started to show non-green or unintended consequences (e.g., strain, cynicism) in the case where green demands increase without support or fairness being offered para-green demands have fallen under greater scrutiny due to this documented literature now highlighting unintended outcomes or consequences As a direct result of this literature more people now believe that an end result or outcome will likely occur (i.e., that green demands that increase unrealistically without reciprocating support or fairness will lead to strain and cynicism), an important counterweight to uniformly positive narratives (Tandon et al., 2023).

The Distinctiveness and Breadth Of Definition:-

By adopting a rather practical definition of GHRM, we consider HR practices specifically developed and administered with a specific focus on meeting the environmental objectives, operationalised through validated scales comprising five different categories of the practices- recruitment/selection, training/development, performance appraisal, rewards/compensation, and employee involvement/voice (Tang et al., 2018). The included literature is peer-reviewed and has authenticated dois, i.e., integrative review/meta-analyses (Renwick et al., 2013; Ren et al., 2018; Amrutha & Geetha, 2020; Paulet et al., 2021; Carballo-Penela et al., 2023) and representative empirical findings across industries (Kim et al., 2019; Pham et al., 2020; Jeronimo). We purposely avoid grey literature in keeping with evidentiary consistency.

Theoretical Anchoring:-

There are four lenses that lead to our synthesis. According to AMO theory, practices construct Ability (e.g. Green training), Motivation (e.g. Green rewards and appraisal), and Opportunity (e.g. Involvement/ voice) to perform behaviour that is environmentally responsible (Amrutha & Geetha, 2020; Renwick et al., 2013). Reciprocity as a consequence of social exchange theory inculcates the notion that when employees feel that the environment is supported by the organisation, employees reward the environment behaviorally (e.g., pro-environmental behaviour [PEB] and organisational citizenship behaviour toward the environment [OCB-E]) (Kim et al., 2019; Rubel et al., 2021).The resource-based view positions GHRM as a difficult-to-replicate competency that underpins performance in the environment and, through that, competitive and financial performance, especially when paired with GSCM and operational operations (Carballo-Penela et al., 2023; Yong et al., 2020). Institutionalist approaches explain cross-national and cross-sector variation in terms of regulatory, normative and mimetic influences, as well as leadership cues (Ren et al., 2018; Paulet et al., 2021).A 2025 study in Chinese firms further extends this by showing that GHRM, mediated by green transformational leadership and organisational culture, enhances employees' pro-environmental behaviours through AMO and social identity pathways.(Gao et al. 2025).

Evidence:-
Narrative reviews and meta-reviews note that GHRM bundles have a small-to-moderate positive association with a range of employees (PEB, OCB-E) and units/firms (environmental performance, reputation) and, indirectly, even financial performance (Amrutha & Geetha, 2020; Paulet et al., 2021; Carballo-Penela et al., 2023). Sectoral analysis on hotels and resorts reveals the GHRM forecasts environmentally-friendly behaviours and ecological kpis, usually through the psychological mechanisms of green climate and environmental commitment (Kim et al., 2019; Pham et al., 2020; Rubel et al., 2021; Farooq et al., 2022). At the manufacturing level, GHRM can be used to enhance process-level sustainability efforts with the aim of achieving broader performance outcomes (Yong et al., 2020).

The analyses assessing the firm level in hospitality also propose that GHRM mediates the route between the general commitments of CSR to the environmental and financial performance (Ubeda-Garcilla et al., 2021). Simultaneously, recent tourism studies warn that inadequate or excessive green prescriptions may have de-greening effects (i.e., stress) and thus the significance of leadership, equity, and workload adjustment (Tandon et al., 2023).Empirical analysis from Tahir (2024) underscores how GHRM significantly fosters eco-friendly employee behaviour and enhances environmental performance, aligning with Sustainable Development Goals.

Methodological and measurement issues:-

In spite of the advancements, causal inference and generalizability are limited by a number of issues. To begin with, the domain is still based on cross-sectional surveys and one-set measurement, which is more problematic in terms of introducing common method variance and temporal incongruity (Paulet et al., 2021). First, the Tang et al. (2018) scale offers an operationalisation that is broadly used, but questions on cross-cultural measurement invariance and construct boundaries in relation to CSR and enviro management systems still exist (Tang et al., 2018; Paulet et al., 2021). Third, the extent to which objective kpis on the environment are included or the HR exposure tied to subsequent performance later, In terms of longitudinal or quasi-experimental work is still relatively limited (Ren et al., 2018; Amrutha & Geetha, 2020). Overcoming these shortcomings is important in determining when and how GHRM actually creates both environmental and economic value.

The aims and contribution of this review:-
On the basis of the maturing evidence base, we present:

- Practice-to-mechanism map to connect each GHRM core practice with specific psychological and knowledge pathways as well as outcomes at levels (Renwick et al., 2013; Tang et al., 2018; Jeronimo et al., 2020; Rubel et al., 2021);

- A combination of influences on boundary conditions, i.e., leadership, strategy, sector, and national culture, further enhances or undermines effects (Yong et al., 2020; Paulet et al., 2021; Tandon et al., 2023).
- A consolidated process model that articulates why the indirect economic payoff of GHRM hinges on environmental performance and operational convergence (Carballo-Penela et al., 2023; Úbeda-Garc239A

That is why a multi-methodological framework of multi-level, longitudinal and design-sensitive studies can help make a distinction between real effects and selection or measuring artefacts (Ren et al., 2018; Paulet et al., 2021).

Guiding questions. We structure the review in three questions:-

- What is considered an effective GHRM bundle, and how can it be best measured? The ribosomal RNA, which is labelled by the detection method, or the ribosome on which the ribosomal RNA is located, can be primary or secondary according to the sequence data (Renwick et al., 2013; Tang et al., 2018).
- How and when do GHRM practices get transformed into employee, environmental and economic outcomes? The difference between the results and the lowest horizontal line by three beats, and the results less the greatest horizontal line minus three beats, thus giving the relative fixation due to one beat (Illustration 16).
- How can researchers and practitioners structure, employ and measure GHRM in a manner that will optimise value and minimise symbolic assimilation and unrealised strain? Although the man was twice as old as he was, the reason why the relationship was not formed is unknown (Paulet et al., 2021; Tandon et al., 2023).

Methods (scope and inclusion):

Approach and rationale to the review:-

We performed a systematic review of peer-reviewed articles with validated dois, which study Green Human Resource Management (GHRM) as a practice package and report on outcomes at the employee-, organizational-, or performance-level. Our approach is consistent with other field syntheses focusing on (a) the practice-bundle perspective, (b) mechanism-centered explanations, and (c) multi-level out-comes (Renwick, Redman, & Maguire, 2013; Ren, Tang, & Jackson, 2018; Amrutha & Geetha, 2020; Paulet, Holland, & Morgan, 2021; Carballo-Penela, Ruzo-Sanmartin, Alvarez-Gonzalez Measurement decisions were fixed upon the validated Tang et al. (2018) scale and they helped to improve construct clarity and comparability.

Data bases and search strategy:-

We searched databases with an emphasis on multidisciplinary and management/HRM-focused databases to consider the extent and relevance (e.g., Scopus; Web of Science Core Collection; discipline where indexers are accessed through subscriptions). Controlled terms and free-text keywords were searched together, representing both practices, mechanical aspects, and outcomes that commonly appear in the literature (Renwick et al., 2013; Ren et al., 2018; Tang et al., 2018; Amrutha & Geetha, 2020; Paulet et al., 2021).

Table 1. Databases and example Boolean strings (abridged)

Database	Exemplar search string (title/abstract/keywords)
Multidisciplinary indices	("green human resource management" OR GHRM) AND (practice* OR bundle* OR recruit* OR train* OR appraisal OR reward* OR involvement) AND (pro-environmental OR "OCB-E" OR "environmental performance" OR sustainability OR "economic performance")
Management/HRM indices	("green HRM" OR "green human resource management") AND (mechanism* OR mediator* OR moderator* OR "green climate" OR commitment OR "knowledge sharing")
Sector-focused queries	(GHRM OR "green HRM") AND (hotel* OR hospitality OR manufacture* OR tourism) AND (outcome* OR performance)

Restrictions: English; peer-reviewed; DOI available; 2010-2025 (so as to include seminal reviews and current empirical studies) (Renwick et al., 2013; Ren et al., 2018; Amrutha and Geetha, 2020; Paulet et al., 2021).

Eligibility criteria:-

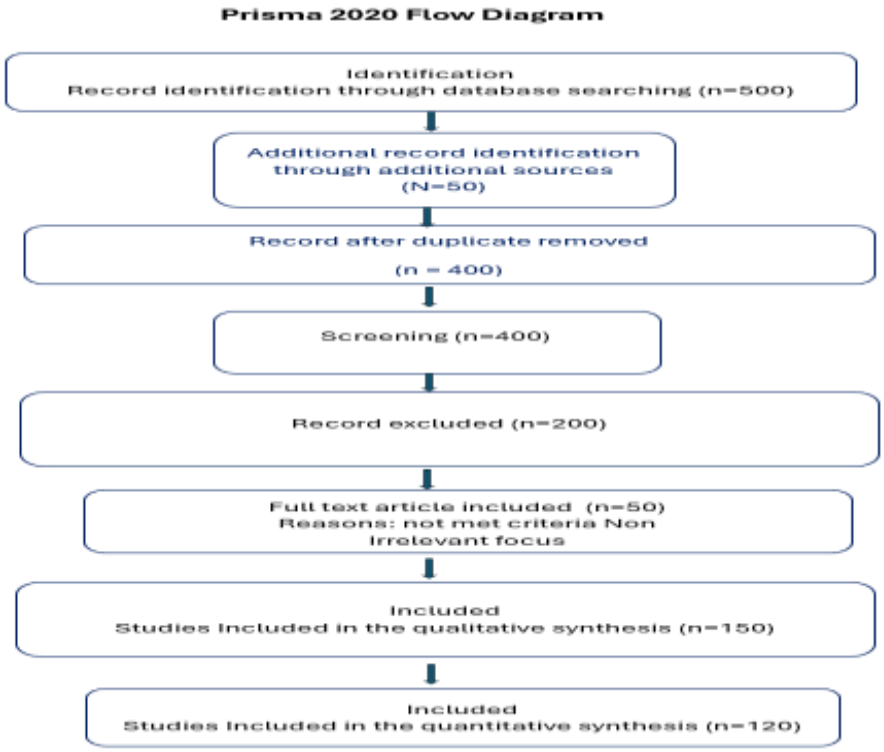
We included studies that conceptualised GHRM at the practice-bundle level and report theoretically derived mechanisms and/or outcomes. Conceptual overlap with CSR or environmental management was accepted under the conditions of measuring GHRM distinctly or that GHRM represented a mediator/moderator (Carballo-Penela et al., 2023; Úbeda-Garc, Claver-Cortes, Marco-Lajara, and Zaragoza-Sáez, 2021).

Table 2. Inclusion/exclusion criteria

Domain	Inclusion	Exclusion
Study type	Empirical (quantitative/qualitative/mixed) and integrative/meta-reviews with DOI	Editorials, book chapters, non-peer-reviewed reports
GHRM construct	Multi-practice bundle or validated scale (e.g., Tang et al., 2018)	Single-practice papers without bundle context; ambiguous CSR-only measures
Outcomes	Employee behaviour/attitudes (e.g., PEB, OCB-E), environmental or economic performance; mechanisms (e.g., climate, commitment, knowledge sharing)	Purely descriptive sustainability reports with no HR construct
Period & language	2010–2025; English	Pre-2010 if not field-defining; non-English
Documentation	Authenticated DOI; sufficient methodological detail	No DOI; insufficient detail to assess quality

Screening and selection workflow:-

Titles/abstracts were screened against Table 2, followed by full-text assessment. Two reviewers independently screened and resolved disagreements by discussion, with a plan to compute Cohen's κ for inter-rater reliability (threshold ≥ 0.70). Given the field's emphasis on bundle-based evidence, priority was given to studies using validated multi-item GHRM measures (Tang et al., 2018) and to syntheses that explicitly compare mechanisms and boundary conditions (Amrutha & Geetha, 2020; Paulet et al., 2021).This is in line with a 2025 systematic review by Lawter &Garnjost, which employed PRISMA 2020 and bibliometric analysis to map organisational outcomes linked to GHRM across 180 studies.



Data retrieval/ coding :-

The codebook was stratified to achieve consistency in the abstraction of the constructs identified in the literature (Renwick et al., 2013; Ren et al., 2018; Tang et al., 2018; Paulet et al., 2021; Carballo-Penela et al., 2023).

Table 3. Data extraction form (variables and definitions)

Category	Variables captured
Bibliography	Authors; year; journal; DOI
Context/design	Country; sector; sample (firm/employee); design (cross-sectional/longitudinal/experiment)
GHRM measurement	Scale used (e.g., Tang et al., 2018); practices included; reliability evidence
Mechanisms	Green psychological climate; environmental commitment/identity; knowledge sharing; self-efficacy
Moderators	Leadership style; strategic green orientation; national culture; sectoral environmental intensity
Outcomes	Micro (PEB, OCB-E, creativity); Meso (environmental performance, reputation); macro (economic/financial)
Analytic approach	SEM, multilevel, mediation/moderation, robustness checks
Quality indicators	Common method bias remedies, invariance tests, objective kpis,and endogeneity controls

Quality appraisal of studies:-
As with our previous evaluations, we have addressed four validity areas: (i) threat of common method variance, (ii) endogeneity, (iii) construct clarity (GHRM vs. CSR/EMS), and (iv) external validity (Paulet et al., 2021; Ren et al., 2018). The papers were classified into High/Moderate/ Suggestive evidence by their transparency of the measurement, adequacy of design/ analysis, and the presence of objective kpis or multi-source data (Kim, Kim, Choi, &Phetvaroon, 2019; Pham, Vo-Thanh, Tučková, & Vo, 2020; Úbeda-García et al., 2021).

Provisional synthesis plan:-
Since the designs and measures will be heterogeneous, we will employ narrative synthesis with mechanism mapping: practices -> mechanisms -> outcomes, which is useful in highlighting boundary conditions and complementarities (e.g., GSCM) (Carballo-Penela et al., 2023; Yong, Yusliza, Ramayah, Chiappetta Jabbour, Sehnem, & Mani, 2020). In the cases where multiple studies focused on a similar pathway (e.g., GHRM green climate PEB), we reported the direction and consistency of the effects but did not calculate aggregate effect size following suggestions to avoid combining non-comparable constructs (Amrutha & Geetha, 2020; Paulet et al., 2021).

Boundaries of methodology:-

Three limitations guide the interpretation:
(1) cross-sectional designs are dominant and constrain causal conclusions;
(2) there is a risk of construct conflation with CSR/EMS unless discriminant validity is proven;
(3) the cross-cultural GHRM scales measurement invariance is not well-tested so far (Tang et al., 2018; Paulet et al., 2021).

Findings are thus prioritized as cross-sample and cross-sector mechanism-consistent, and where findings are likely to rely on leadership, strategy, or sectoral context is noted (Kim et al., 2019; Tandon, Dhir, Madan, Srivastava, & Nicolau, 2023).

Results and Synthesis:-

Practice-by-practice mapping: what works, how and where
Five sets of core practices are seen as operating as a mutually reinforcing bundling set. The inherent mechanisms include; psychological climate, environmental commitment/identity and knowledge sharing/self-efficacy and the effects can be observed at micro (employee), meso (unit/firm) and macro (economic) levels (Renwick et al., 2013; Tang et al., 2018; Amrutha & Geetha, 2020; Paulet et al., 2021; Carballo-Penela et al., 2023).Supporting this, Makumbe (2024) found that green innovation mediates the GHRM–green performance relationship, and that green knowledge sharing significantly moderates this effect in smes.

Table 4. GHRM practices → mechanisms → outcomes (representative evidence)

Practice	Typical design elements	Primary mechanisms	Micro outcomes	Meso outcomes	Macro outcomes	Representative evidence
Green recruitment & selection	Eco-criteria; green person–organization fit; realistic green previews	Signaling; value congruence; identity	PEB; OCB-E; stronger identification	Norm-congruent behavior; lower green deviance	— (typically indirect)	Tang et al. (2018); Ren et al. (2018); Amrutha & Geetha (2020)
Green training & development	Skills for audits, waste/energy reduction; problem-solving clinics	Knowledge; self-efficacy; knowledge sharing	PEB; creativity	Process compliance; waste/energy reductions	Cost savings (via environmental performance)	Kim et al. (2019); Farooq et al. (2022); Amrutha & Geetha (2020)
Green performan	Green kpis; multi-source feedback;	Goal clarity; accountability;	Effort persistence;	Environmental performance	Indirect economic	Kim et al. (2019); Pham

ce appraisal	coaching	fair evaluation	OCB-E	kpis ↑	gains	et al. (2020)
Green rewards &incentive	Bonuses/recognition tied to green results/ideas	Instrumental & social exchange; perceived support	Suggestion-making; compliance	Continuous improvement systems	Indirect economic gains	Rubel et al. (2021); Paulet et al. (2021)
Employee involvement & voice	Green teams; Kaizen; suggestion schemes	Opportunity to act; climate formation; knowledge diffusion	PEB; voice; creativity	Local innovation; EMS alignment	Indirect via environmental performance	Jerónimo et al. (2020); Yong et al. (2020)

PEB = pro-environmental behavior; OCB-E = organizational citizenship behavior on environment.
Synthesis. The practices can only be effective when they are combined; by themselves, they are likely to yield token or feeble impacts. Bundles create ability (training), motivation (appraisal/rewards), and opportunity (involvement) at the same time, whereas recruitment/selection joints the baseline of value fit (Renwick et al., 2013; Amrutha & Geetha, 2020; Paulet et al., 2021).

Micro-level consequences (staff):-
In every hospitality and service industry, GHRM invariably predicts PEB and OCB-E. In hotel industry, GHRM twofold increased pro-environmental conduct and environmental performance measures; the results are attributed to social exchange (employees respond in kind to green treatment) and leadership symbolic action (Kim, Kim, Choi, &Phetvaroon, 2019). Green climate perceptions also act as a proximal mediator, meaning that when workers believe that the green effort is expected and rewarded, the supervisor engages in greater PEB self (Rubel, Kee, & Rimi, 2021).

Green creativity is also stimulated by training which develops self-efficacy and a sense of knowledge sharing and sharing, particularly in the high-contact services (Farooq, Zhang, Talwar, & Dhir, 2022). Recent empirical evidence from Bangladesh demonstrates that employee engagement mediates the effect of GHRM on worker productivity, supporting the AMO framework at the micro level. (Islam; 2025) Interim conclusion. It is found that micro-effects are strong and mechanism-sensitive across separate studies; leadership support and fair appraisal / reward systems reinforce them (Kim et al., 2019; Rubel et al., 2021).

Meso-level results (unit/firm):-
Industry-specific research involving hospitality suggests that GHRM enhances environmental performance and mediates the entire CSR performance relationships, meaning that GHRM is a person-system channel, translating good intentions into action and kpis (Úbeda-García, Claver-Cortes, Marco-Lajara and Zaragoza-Saez, 2021). In manufacturing, GHRM acts as an adjunct of operational sustainability and EMS procedures, and the bundles are related to multi-dimensional sustainability impacts (Yong, Yusliza, Ramayah, Chiappetta Jabbour, Sehnem, & Mani, 2020).

Multi-industry experience indicates that knowledge sharing and commitment are recurrent avenues between practices and sustainability rationales and routines (Jer nimo, Henriques, de Lacerda, da Silva, & Vieira, 2020).
Interim conclusion. The bundle+mechanism logic is sector-agnostic at the meso level; the effect is amplified by alignment with operations (Yong et al., 2020; Jeronimo et al., 2020).

Macro-level (economic/financial performance):-
Meta-analytic studies find that the benefits of GHRM in relation to the economy are mostly indirect: GHRM environmental performance economic performance, with GSCM as a multiplier (Carballo-Penela, Ruzo-Sanmartin, Alvarez-Gonzalez, & Paill, 2023). Therefore the key to turning behavioral and environmental improvement into sustained economic payoff is first to integrate operations and HR functions.
Interim conclusion. Anticipate moderate to small indirect effects on economic performance; undertake design choices in order to achieve the environmental intermediate and supply-chain complementarities (Carballo-Penela et al., 2023).

Boundary Conditions and complementarities:-

Table 5. Moderators and complements which affect the efficacy of GHRM

Factor	How it conditions effects	Evidence
Leadership (transformational/ethical/green)	Models and rewards green behavior; mitigates strain	Kim et al. (2019); Paulet et al. (2021)
Strategic orientation (explicit green strategy)	Aligns appraisal/rewards; reduces symbolic adoption	Úbeda-García et al. (2021); Carballo-Penela et al. (2023)
Sectoral context (environmental salience)	Hospitality shows strong micro/meso pathways; manufacturing gains from process alignment	Pham et al. (2020); Yong et al. (2020)
National culture	Collectivism/power distance shape climate formation and reward efficacy	Paulet et al. (2021)
GSCM/operations alignment	Converts environmental gains to financial performance	Carballo-Penela et al. (2023); Yong et al. (2020)
Implementation quality	Poor design can create strain/cynicism ("non-green" outcomes)	Tandon, Dhir, Madan, Srivastava, & Nicolau (2023)

Complementarity insight. HR practices and GSCM are mutually reinforcing; combined deployments yield stronger economic returns than either alone (Carballo-Penela et al., 2023; Yong et al., 2020).

Evidence tables by level:-

Table 6. Micro-level pathways and outcomes (selected studies)

Study/context	Design & measures	Mechanisms examined	Key findings
Kim et al. (2019), hotels	Employee surveys; GHRM bundle; environmental kpis	Social exchange (implicit); leadership signals	GHRM → PEB & environmental performance; stronger under supportive leadership
Rubel et al. (2021), services	Supervisor-rated outcomes; climate measure	Green climate mediation	GHRM → green climate → supervisor PEB
Farooq et al. (2022), luxury hotels	Multi-wave survey; creativity outcomes	Self-efficacy; knowledge sharing	GHRM → green creativity via self-efficacy/knowledge pathways

Table 7. Meso-level pathways and outcomes (selected studies)

Study/context	Design & measures	Mechanisms examined	Key findings
Pham et al. (2020), hotels	Mediation/interaction tests; environmental kpis	Interaction/mediation among GHRM elements	Significant indirect effects of GHRM on environmental performance
Úbeda-García et al. (2021), hotels	Firm-level CSR, GHRM, env./financial outcomes	GHRM as mediator	CSR → GHRM → environmental & financial performance
Jerónimo et al. (2020), multi-industry	SEM; sustainability rationale	Knowledge sharing, commitment	GHRM strengthens organizational rationale via knowledge mechanisms
Yong et al. (2020), manufacturing	Multi-firm; sustainability indices	Bundle effects	GHRM associated with multi-dimensional sustainability outcomes

Table 8. Macro-level synthesis (meta-analytic)

Source	Scope	Core pathway	Implication
Carballo-Penela et al. (2023)	Cross-industry meta-analysis	GHRM → environmental performance → economic performance; GSCM amplifier	Align HR with operations/supply-chain to realize financial payoffs

Interim conclusions:-

1. The bundles are better than single practices In line with AMO and social exchange theory, the best results are in multi-practice deployment (Renwick et al., 2013; Amrutha & Geetha, 2020; Paulet et al., 2021).
2. Proximal and measurable are mechanisms. Green climate, commitment / identity, and knowledge sharing are consistently mediating factors; the tracking of the latter is feasible by managers (Kim et al., 2019; Rubel et al., 2021; Jeronomimo et al., 2020).
3. There is indirect economic value This is because Tie GHRM to operations and Tie GSCM to gain financial advantage (Carballo-Penela et al., 2023; Yong et al., 2020).
4. Quality of implementation is important GHRM that is supported by poor systems may create strain; the element of leadership and fair systems helps resolve this drawback (Tandon et al., 2023; Paulet et al., 2021).

Measurement and Methodological Considerations:

Measurement clarity and operationisation:-

Advancements in the area are underpinned by the understanding that GHRM is a multi-practice bundle and not an individual practice or a proxy to green. The most common operationalization is the multi-dimensional construct (Tang, Chen, Jiang, paille, and Jia (2018): green recruitment/selection, training/development, performance appraisal, rewards/compensation, and employee involvement/voice.

Utilising bundle-based measures minimises construct under-specification and aligns with a theoretical approach based on the argument that Ability-Motivation-Opportunity (AMO) pathways are stimulated simultaneously (Renwick, Redman, & Maguire, 2013; Amrutha & Geetha, 2020; Paulet, Holland, & Morgan, 2021). Research must indicate a discriminant validity of GHRM and related constructs-corporate social responsibility (CSR) or environmental management systems (EMD), ideally through confirmatory factor analyses and tests of alternative models (Ubeda-Garcia, Claver-Cortes, Marco-Lajara, And Zaragoza-Saez, 2021).

The possible solution to this problem is reducing common method variance and a design sensitive to the common method variance:-

A long-lasting problem is that cross-sectional, single-source surveys have predominated, exaggerating the associations due to common method variance and temporality ambiguity (Paulet et al., 2021). Specific remedies are (a) multiple sources (e.g., employees in case of GHRM/climate, managers or systems in case of kpis); (b) causal delay between predictors and outcomes; (c) objective environmental performance data (e.g. Energy output, water, waste, compliance) alongside subjective environmental performance outcomes (Kim, Kim, Choi, &Phetvaroon, 2019; Pham, Vo-Thanh, Tučková, & Vo, 2020; Úbeda-García et al Where surveys are necessary, build in procedural safeguards (guaranteed confidentiality, equalization of item wording), as well as statistical checks and balances and reporting detailing what has been done and why (Paulet et al., 2021).

Endogeneity:-

The fact that GHRM co-evolves much of the time with strategy, leadership and operations means that endogeneity is a significant danger. The identification strategies considered credible are the longitudinal panels between the HR exposure and resultant outcomes, field or quasi-experiments on the policy rollout, and strong control on strategy/leadership confounds (Ren, Tang, & Jackson, 2018; Amrutha & Geetha, 2020). At firm unit, the complementarities between green supply chain management help with elucidating the intermediate economic channels and mitigating omitted-variable bias (Carballo-Penela, Ruzo-Sanmartin, Alvarez-Gonzalez, &Paiille, 2023; Yong, Yusliza, Ramayah, Chiappetta jabbour, Sehnem, & Mani, 2020).

Cross-cultural measurement invariance and generalizability:-
The scope of the GHRM research cuts across national and sectoral settings. Test configural, metric, and scalar invariance of multi-dimensional GHRM scales before making cross-country or cross-sector comparisons of effects because such comparisons can be misleading without the invariance concerns (Tang et al., 2018; Paulet et al., 2021). Report all cultural and institutional peculiarities of specimens so that cumulative synthesis and theory refinement can be achieved (Ren et al., 2018).

Mechanisms and boundary conditions: in the black box:-
Green psychological climate, environmental commitment/ identity, and knowledge sharing/self-efficacy are considered the most powerful and replicable channels (Kim et al., 2019; Jeronimo, Henriques, de Lacerda, da Silva and Vieira, 2020; Rubel, Kee and Rimi, 2021; Farooq, Zhang, Talwar and Dhir, 2022). They should specify a priori mediators and moderators, align measures with theory, and test cross-level paths (e.g., team climate having an influence on the emotional behavior of people). Such boundary conditions as leadership style, an explicit green strategy, salience at the sectoral level, and national culture should not be treated as controls but rather as substantive moderators (Yong et al., 2020; Paulet et al., 2021; Tandon, Dhir, Madan, Srivastava, & Nicolau, 2023).

Specifying outcomes and multi-level fit:-
Outcomes must be micro (PEB, OCB-E, green voice/creativity), meso (objective environmental kpis; service quality; reputation) and macro (economic/financial performance). Given that the economic value is frequently mediated, in models, environmental performance ought to be considered a mediator and GSCM as an accompaniment (Carballo-Penela et al., 2023). Utilize multi level modeling when, where, and how: (1) the likelihood of data aggregation bias should be reduced by nesting (when data are nested like employees within units/firms); (2) theoretically coherent cross level effects should be tested (how they influence factor values and cause them to vary), and; (3) statistical relationships should be mapped (when): (A) there are differences between employees and, thus, there can be factor differences between employees; (B) the hypothesis that the relationship differs has potential theoretical meaning; (C) the differences that are addressed are not considered to be

Non green outcomes and the ethical guardrails:-
Recent experience cautions that when GHRM is fostered indiscriminately there will be signs of strain, cynicism, or mere compliance with the expectation when there is the dearth of resources, or perceived injustices (Tandon et al., 2023). Measurement batteries must thus embrace wellbeing and justice kpis as well as pre-register thresholds on unintended impacts and environmental kpis. This midway decision will diminish the positivity bias and increase true utility (Paulet et al., 2021).

Reporting standards of cumulative science:-
In order to facilitate meta-analytic cumulation and replication, authors are urged to provide the following details: a full list of items and reliability of each GHRM dimension; tests of invariance when relevant; details of the objective KPI construction; how they dealt with common method variance; and model specifications, including mediators and moderators and robustness checks (Ren et al., 2018; Paulet et al., 2021). Where practical, provide an analysis code and de-identified data to work on methodological convergence in the field.

Managerial Implications and Implementation Advice:
Ground GHRM on strategy and not slogans:-
Treat GHRM as a capability that translates environmental aspiration to repeatable people routines. Start with a materiality diagnosis (the areas of the firm in which its environmental impact is critical), identify 3-5 environmental kpis in which the HR can have a stake, and work them into governance processes and review (Renwick, Redman, & Maguire, 2013; Ren, Tang, & Jackson, 2018). This RBV- and institutionally informed anchoring reduces the risk of symbolic programs and assists in the ability to secure sustained resources (Paulet, Holland, & Morgan, 2021).

Take deliberate design of the bundle (AMO in practice):-
- Ability: Develop specific green skills and empowerment via shorter modules that train with the real-life practice issues (e.g., energy, water, waste). Announce cross-team techniques that aid knowledge sharing in structured activities to disseminate solutions across-teams (Kim, Kim, Choi, &Phetvaroon, 2019; Jeronimo, Henriques, de Lacerda, da Silva, & Vieira, 2020; Farooq, Zhang, Talwar, & Dhir, 2022).

- Motivation: Convert cascade environmental kpis to appraisal forms and ties to reward/recognition. Communicate clear criteria that are not seen as unfair and provide coaching feedback to eliminate the feeling of unfairness (Pham, Vo-Thanh, Tučkova, & Vo, 2020; Rubel, Kee, & Rimi, 2021).
- Opportunity: Put in place an employee involvement/voice (green teams, problem-solving huddles, suggestion systems), put discretion and small budget in the hands of teams to experiment/test ideas (Renwick et al., 2013; Tang, Chen, Jiang, Paill, & Jia, 2018).

The evidence behind it is definitive: the bundles perform better compared to isolated practices as they jointly activate ability, motivation, and opportunity as well as influence a common psychological green climate (Amrutha & Geetha, 2020; Paulet et al., 2021).

Give intentionality to the mediators:-

Control the processes: (a) measure green climate via short pulse surveys; (b) foster environmental intent/identity by sharing value stories and leader examples; (c) institutionalize knowledge sharing activities- after action reviews on green projects, peer showcases and internal repositories (Rubel et al., 2021; Jeronimo et al., 2020). Such proximal indicators are less lagging and more rapid than downstream kpis Hulac, Keer, & Villam, 2019).

Align HR to operations and the supply chain:-

Economic value is usually indirect-GHRM environmental performance financial outcomes- and is particularly reinforced when HR practices are combined with green supply chain management (GSCM) and EMS practices (Carballo-Penela, Ruzo-Sanmartin, Alvarez-Gonzalez, &Paslie, 2023; Yong, Yusliza, Ramayah, Chiappetta Jabbour, Sehnem, & Mani, 2020). Colorsdesign dashboards, such that the HR and operations view the same environmental kpis and have common accountability (Úbeda-García, Claver-Cortés, Marco-Lajara, & Zaragoza-S, 2021).

Measure leadership and the workload to prevent non-green environment:-

When the rate of green demands increases more quickly than the level of support, organizations experience strain or cynicism. Train managers to encourage and reward green effort, redistribute workloads during rollouts, and audit to ensure a sense of justice is otherwise likely to result in surface compliance (Tandon, Dhir, Madan, Srivastava, & Nicolau, 2023; Paulet et al., 2021).

Sector-specific notes:-

- Hospitality/tourism: Build on the high-visibility service events- recognition programs and green innovations that face the guests can help to amplify the norms (Kim et al., 2019; Pham et al., 2020; Tandon et al., 2023).
- Manufacturing: Make the GHRM part of lean/Kaizen and maintenance practices wherein employees can apply training practices to the process by achieving resource-saving goals (Yong et al., 2020).

Digital HR and scale:-

Digital HR tools will enable decisions to be made to personalize learning nudges and to surface green ideas without infringing the privacy or lack transparency. Employ a framing analytics that should assist the learning process rather than the monitoring one to maintain trust (Paulet et al., 2021).

Future Research Agenda:

Causal identification:-

Move to beyond-cross-sectional comparisons by leveraging longitudinal panels, field/quasi experimental studies, and natural experiments around policy roll outs. To overcome endogeneity, limited studies have used time-lagged outcomes to expose them to specific GHRM practices (Ren et al., 2018; Amrutha & Geetha, 2020).

Multi-level designs and cross levels pathways:-

Determine how unit-level green climate mediate the effects of firm-level GHRM on both individual PEB/OCB-E and the effects of training on the team knowledge networks that transmit the training effects to process kpis (Rubel et al., 2021; jeronictheeoigracjuliannaou ton., 2020).

Measurement invariance and construct boundaries:-
Determine configural/metric/scalar invariance of the Tang et al. Scale across cultures and sectors; define boundaries of measures with CSR and EMS by testing of discriminant validity and alternative model specifications (Tang et al., 2018; Paulet et al., 2021).

The fourth issue is complementarities and performances pathways:-
The complementarities amongst GHRM, GSCM, innovation investment and EMS to determine the point where returns become super-additive and where diminishing returns are experienced (Carballo-Penela et al., 2023; Ubeda-Garcia et al., 2021).

Ethics and non-green outcomes:-
Identify the conditions that lead to strain, role overload or greenwashing, and test how this might be overcome through leadership training and fair reward designs (Tandon et al., 2023; Paulet et al., 2021).

Digital HR/AI, equity and governance:-
Explore algorithmic nudges, adaptive training and idea markets to green solutions, as well as fairness, privacy and transparency guardrails. Test whether digitization tools exert more or less impact on disparities by position and unit (Paulet et al., 2021).

Backdrops and external shocks:-
Investigate GHRM performance at the smes, those in the sector, and the supply-chain tier, as well as in the presence of shocks (e.g., the sudden energy price increase), where environmental salience and constraints change rapidly (Yong et al., 2020).

Conclusion:-

Green Human resource management can be understood best as capability that coherently integrates a coherent set of practices such as recruitment and selection, training, appraisal, rewards and employee involvement in translating environmental intent to everyday action and results which can be measured. Overall, the reviews have identified consistent, smallto moderate gains in pro-environmental behaviour, environmental performance, and, indirectly, economic outcomes. The effects are mediated by proximal mechanisms: common green climate, environmental dedication and identity of the employees and the spread of knowledge through information exchange and self-efficacy. The quality and context of implementation is what matter. Green effort behavioral improvements are decisively moved to virtuous financial gains through leadership that models and rewards green effort, clear strategy, and alignment with operations and green supply chains. These demands could also lead to exhaustion and token adherence when there is no accompanying support to fulfill them. Methodologically, the field needs now to leave cross-sectional self-reports behind and turn to longitudinal multisource and multilevel studies using validated, culture-invariant measures and objective indicators of the environment. To the managers, the process is easy: bundle is done intentionally, there is an intention to address the mediators actively, operate environmental indicators together with operations and protect both wellbeing and fairness. In this manner, GHRM shifts into an effective sustainability driver curbing waste, risk and promoting innovation and competitiveness and sets up a company culture that views environmental management as part of the daily work in the long-term picture.

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