Intellectual Structure of Green Human Resource Management and Environmental Self-Efficacy: Mapping Research Trends

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ABSTRACT

The analysis is focused on three aims: first, analyzing publishing trends and geographical representation, detecting emerging themes, and questioning the intellectual structure and future of the field. Using a bibliometric method, the study retrieved and analyzed 142 papers in the Scopus database with the support of VOS viewer and BiblioMagika. The results indicate that there has been a growing academic interest in GHRM and ESE, especially since 2020. The Asian countries, especially Pakistan, Malaysia, and China, have made noticeable contributions. Two main thematic groups were identified: one of the strategic constructs, sustainability, corporate social responsibility, and innovation, and the other of the psychological constructs, green behavior, self-efficacy, and human resource practices. The discussion explains why ESE is a crucial psychological process in GHRM that links HR policies and sustainable employee conduct. The implications of the study's findings are theoretically synthesized, enhancing GHRM and the ESE models by creating sustainability-based labor structures. The study can guide managers in developing GHRM interventions that will foster pro-environmental cultures. Overall, the study contributes to conceptual clarity by combining behavioral science with organizational sustainability, which implies a conscious shift toward employee-centric environmental change.

Keywords: green management, human resource, environmental self-efficacy

INTRODUCTION

The growing pressure to address the challenges of environmental degradation and the advent of climate change has compelled organizations worldwide to raise the issue of sustainability to the level of a strategic imperative. In this regard, Green Human Resource Management (GHRM) has become one of the key processes of instilling environmental consciousness in employee behavior and organizational activities. GHRM aims to develop pro-environmental behaviour by systematically incorporating pro-environmental activities into conventional human resource (HR) functions (recruitment, training, performance management, and employee engagement) and, thus, promoting the pro-environmental culture on all organisational levels (Carballo-Penela et al., 2022). Another important psychological concept supporting this paradigmatic course is environmental self-efficacy (ESE), that is, how employees feel about their ability to perform actions likely to impact the environment, which correlates positively with behavioural intentions. Despite the growing interest in the literature on the relationship between GHRM and ESE, a unified theoretical understanding has not been achieved, and it is necessary to examine this issue in terms of empirical and theoretical analysis (Miah et al., 2024).

The existing literature review of GHRM and ESE toward employee engagement in organisations tends to stay disjointed. Most studies look into these areas independently or lack an adequate sample size to produce a strong outcome. As such, no cohesive theoretical guide in the field would help explain the intellectual history, influential figures, growth trends, and the potential of cross-disciplinary cooperation in it (Musaddiq et al., 2024). Even though the importance of employee green behaviour and organisational support to environmental performance improvement has been highlighted in recent studies, the general body of knowledge still needs a systematic synthesis and mapping of emerging trends to inform future trend on GHRM and ESE (Farrukh et al., 2023).

Thus, this review outlines a gap that should be addressed through a bibliometric examination of the last decade to identify conceptual and intellectual connections between GHRM and ESE. This type of analysis is necessary as the world is committed to becoming more sustainable faster, and post-pandemic organizational changes are taking place (Kavvadia, 2022). The study's novelty lies in the integrative nature of the study design that unites GHRM, ESE, and pro-environmental behavior within the same bibliometric map. Unlike in the previous bibliometric reviews, which have explored GHRM generally, very few have explored its psychological roots, the ESE, and their implications on green behavior and sustainable organisation performance outcomes. Thus, the current study addresses the following three research questions (RQs):

RQ1: What are the current publication trends in GHRM and ESE (Publication Trend, Annual Trend Publication, Most Productive Sources, Publication by Countries, Top 10 Productive Authors, Top 10 Productive Institutions)?

RQ2: What are the identified research themes among researchers in this GHRM and ESE field?

RQ3: What are the study's current intellectual structure and future direction of GHRM and ESE?

METHOD

The study's methodology is based on the framework developed by Linnenlukke et al. (2020) to perform a bibliometric analysis. By applying this methodology, the researcher acquires a complete understanding of the research field and its boundaries and identifies both the impactful authors and the new directions of possible research. Bibliometric approach is appropriate since it eliminates subjective evaluation to unveil the objective intellectual structure of the discipline (Xue et al., 2018). In line with Donthu et al. (2020), Leung et al. (2017), and Xu et al. (2018), these techniques can be defined as cross-disciplinary tools that create powerful structures of understanding thematic paths and research directions in dynamic academic spaces (Khanra et al., 2020, 2021; Liao et al., 2018; Martínez-L´opez et al., 2018).

This analysis explores the directional trend of research on the intellectual framework of GHRM and ESE by applying bibliometric analyses. The article uses bibliographic coupling, co-occurrence, and network analysis and has a similar analytic approach to that of Khanra et al. (2020). The Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) framework was applied to perform its systematic literature review (SLR), and a final list of 138 records was identified and finally used for further analysis, as shown in Figure 1.

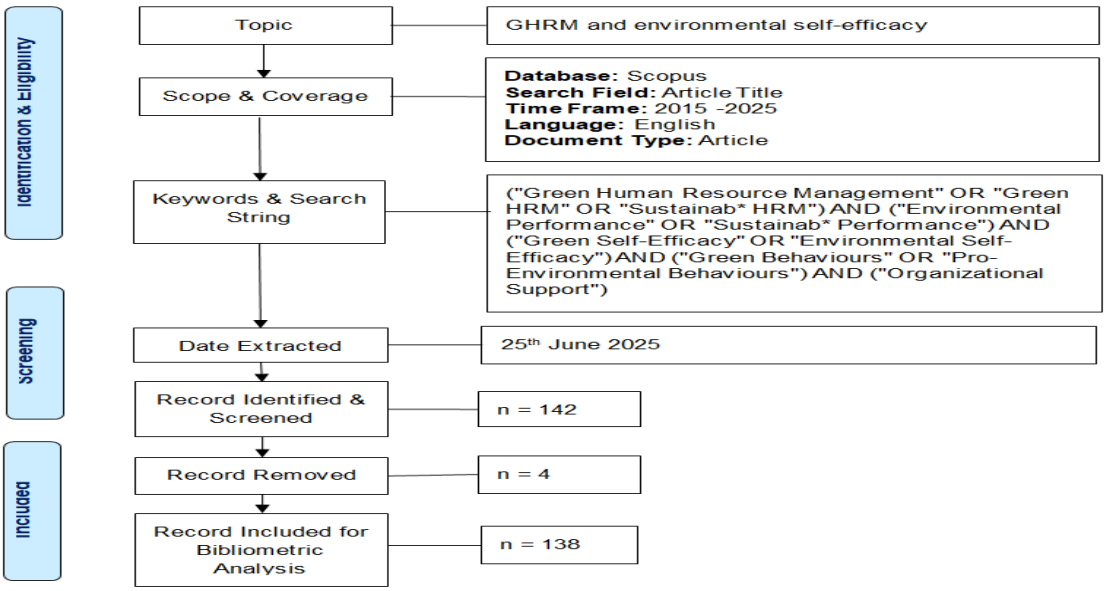

Figure 1. Prisma Flow Diagram

To retrieve pertinent articles, a search query using the TITLE-ABS-KEY was entered (refer to the keywords and search string), and Table 1 shows the criteria used to determine whether the retrieved article should be included or excluded.

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Table 1. Inclusion and exclusion criteria

Criteria	Value
Inclusion criteria	a. Keywords search was based on all fields b. Documents written in the English language c. Documents published between 2015 and June 2025 d. Document types are limited to article, book chapter, conference paper, review, book, conference review, and editorial note
Exclusion criteria	a. Date of publication before 2015 b. Documents published in non-English languages

Data analysis and cleansing were also performed with the help of bibliographic and Biblio Magika @ split tools. The information gathered from biblio Magika @Split and VOS viewer was merged, and then the bibliometric network and emergent trends were analyzed. Biblio Magika® is suggested to be an analytical instrument built into Excel for carrying out bibliometric calculations, emphasizing the evaluation of productivity in publishing and the analysis of scholarly output. Furthermore, Biblio Magika® also helps researchers process and prepare this data for subsequent use in VOS viewer and Biblioshiny (Aidi Ahmi, 2021; Aidi Ahmi, 2022).

RESULTS AND ANALYSIS OF FINDINGS

Nine analyses were performed on the 138 GHRM and ESE records, and the results are reported below.

Document Type

Table 2 shows how the document types in the dataset are distributed. The most significant contributions are in journal articles and 278 publications, 83.73 percent of the total output. It means that scholarly journal articles are the primary vehicle for spreading research in this area. The second most frequent type is book chapters with 18 entries (5.42%) and conference papers with 17 publications (5.12%). There is also a representation of review articles, although to a lesser degree, since it comprises 3.61 percent, with the number being 12. Other document types, such as books (0.90%), notes (0.60%), conference reviews (0.30%), and errata (0.30%), are infrequently used. The prevalence of journal articles indicates a high level of attention to peer-reviewed works in the academic discussion of this field of study.

Table 2. Document type

Document Type	TP	%
Article	278	83.73%
Book Chapter	18	5.42%
Conference Paper	17	5.12%
Review	12	3.61%
Book	3	0.90%
Note	2	0.60%

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Conference Review	1	0.30%
Erratum	1	0.30%

The publication tendency of journal articles (83.73%) implies a high academic interest in disseminating peer-reviewed knowledge that reaffirms the validity and quality of studies in this field. This trend strategically allows scholars and institutions to invest in high-impact journal publications to improve visibility and academic impact. The relatively minor share of books and conference proceedings suggests that opportunities for interdisciplinary growth and broader participation of practitioners have not been fully exploited (Rahman & Nguyen-Viet, 2023). Strategies that might be implemented in the future might be developing diversified products like policy briefs and practitioner-oriented chapters to address academic and applied research gaps.

Publication by Year

The trend of annual scientific publications is illustrated in figure 2, which shows that there are significant changes over the past decade and that the number of GHRM and ESE research outputs has risen dramatically within the last few years. Between 2010 and 2015, the publication activity was rather low and stable. Nevertheless, since 2016, a gradual upward trend in the annual production is recorded and the highest production is recorded in 2022 (97 publications). This explosion indicates greater research interest and academic investment in the GHRM and ESE. It is notable that the decrease is visible in 2023 and 2024, with 77 and 32 publications, respectively, which may be caused by the incompleteness of the data of recent years or the saturation of the basic research.

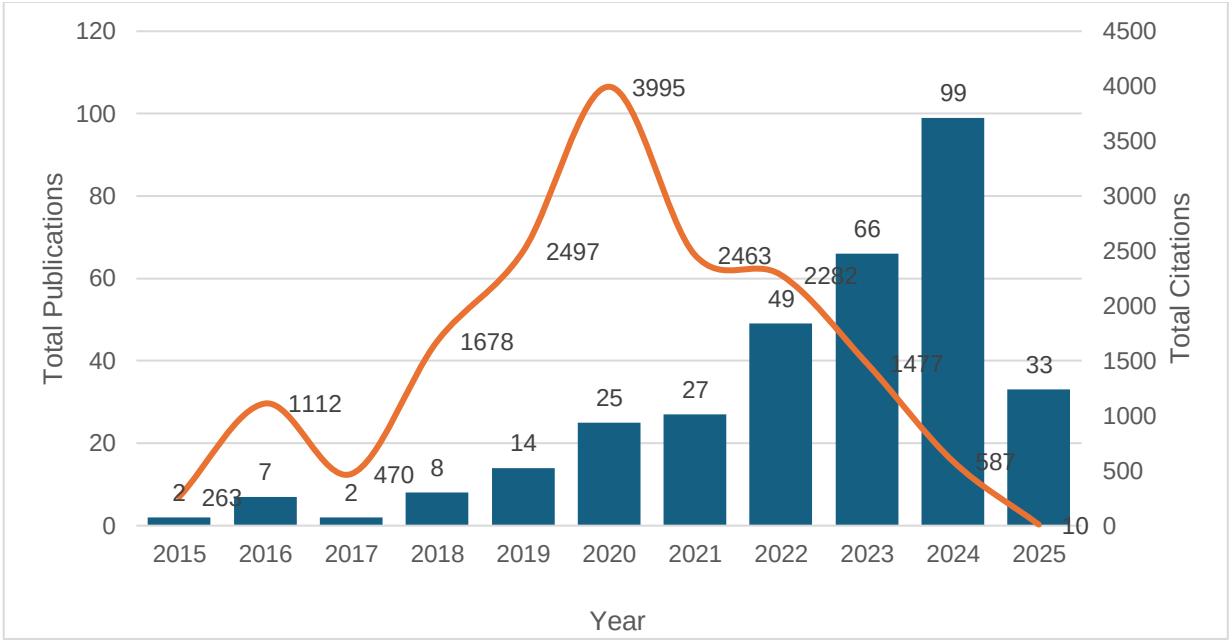

Figure 2. Publication by Year

Also, it can be seen that the increase between 2016 and 2022 is quite sharp, which is likely due to the growing international focus on the field over the period in question, as a result of the developments in policy frameworks and funding programs, as well as the academic cooperation in the field. The 2022 peak implies a stage of maturity of the research cycle, when the underlying theories and empirical studies could have been thoroughly investigated. Strategically, the trend has demonstrated a possibility for stakeholders to move away from fundamental research and more applied, interdisciplinary, and innovation-oriented research (Singh et al., 2025). Plans can be devoted to investigating new subareas, enhancing the technology transfer, or correlating the research results to sustainable development issues.

The recent upslope is not understood as a loss of significance but as a transition period, which may provide opportunities to consolidate knowledge, synthesize evidence, and expand into previously underdeveloped areas. In addition, the institutions can use this trend to invest in global partnerships and capacity-building initiatives to

secure the sustainability and transformation of the research ecosystem. Overall, the tendency indicates that consolidation and diversification of efforts are important aspects of remaining relevant and having a strategic impact on future scholarly directions.

Top Sources

As Table 3 shows in its analysis of top source journals, it is possible to find critical insights into how scholarly work is disseminated and influences the GHRM and ESE. As can be observed, Sustainability (Switzerland) has the highest number of publications (TP = 23) because it is open to interdisciplinary and emerging issues related to sustainability. Nonetheless, Journal of Cleaner Production, even though having fewer published materials (TP = 16), has accumulated the most significant number of total citations (TC = 2,962) and a considerable number of citations-per-publication (C/P = 185.13), which indicates a more profound academic impact and greater acknowledgment in the academic community. The same is evidenced by journals such as Corporate Social Responsibility and Environmental Management and Business Strategy and the Environment, which show high citation performance compared to the number of articles published, meaning they have a high impact per article.

Strategically, the result implies that it is highly effective to aim at journals with high citation rates, such as the Journal of Cleaner Production and the International Journal of Human Resource Management, as it can significantly contribute to increasing research visibility and academic reputation. In addition, the high value of h-index and g-index in these journals indicates a stable performance and impact over the years in the scholarly world. To those institutions and researchers, submitting to these high-impact outlets makes their work more widely disseminated and aligns with measures of success in academic performance and funding.

In terms of strategy, future dissemination of research should pursue both volume and influence, with a mixture of outlets such as Sustainability in terms of accessibility and reach, and high-citation journals in terms of authority. Also, young scholars may find interdisciplinary journals with high m-index values (e.g., Environmental Science and Pollution Research) to be an efficient tool to establish a long-term scholarly reputation. This complex publishing model will be crucial in achieving optimal academic contribution and strategic positioning in the knowledge economy as it transforms (Shan & Wang, 2024).

Table 3. Top Sources

Source Title	**TP**	**NCA**	**NCP**	**TC**	**C/P**	**C/CP**	***h***	***g***	***m***
1. Sustainability (Switzerland)	23	91	19	645	28.04	33.95	12	23	1.200
2. Journal of Cleaner Production	16	51	16	2962	185.13	185.13	15	16	1.667
3. Corporate Social Responsibility and Environmental Management	10	33	9	871	87.10	96.78	6	10	0.857
4. International Journal of Manpower	8	33	8	916	114.50	114.50	7	8	1.167
5. Environmental Science and Pollution Research	8	30	8	368	46.00	46.00	6	8	1.200
6. Benchmarking	8	31	8	708	88.50	88.50	8	8	1.143
7. Business Strategy and the Environment	8	26	7	909	113.63	129.86	6	8	0.857

8. International Journal of Human Resource Management	6	18	5	1317	219.50	263.40	4	6	0.364
9. International Journal of Sustainable Development and Planning	5	20	4	13	2.60	3.25	2	3	0.667
10. Journal of Hospitality and Tourism Insights	5	20	2	43	8.60	21.50	2	5	1.000

Note: TP=total number of publications; NCA=number of contributing authors; NCP=number of cited publications; TC=total citations; C/P=average citations per publication; C/CP=average citations per cited publication; h=h-index; g=g-index; m=m-index.

Top Authors

Table 4 trend analysis of the top authors shows that scholars' notable contributions in GHRM and ESE, and how they relate to the environmental performance. The table shows high-impact articles are published in highly-regarded journals, including Technological Forecasting and Social Change, Journal of Cleaner Production, and Business Strategy and the Environment. The first position is held by the study of Singh et al. (2020) on green innovation and leadership, with 1,246 citations and an annual average of 207.67, demonstrating influence and relevance. Likewise, Kim et al. (2019) and Roscoe et al. (2019) are not far behind, and this tendency indicates the increased interest in the impact of GHRM on employee behavior and organizational culture.

These results highlight a coherent research pathway based on incorporating environmental sustainability within HRM practices. The large number of citations indicates that GHRM and ESE are not just emerging academic subjects but practical issues in all sectors. In this regard, future studies are bound to focus more on empirical validations, longitudinal studies, and cross-sectoral comparisons to enhance generalizability. In addition, the popularity of multi-authored articles shows the importance of collaborative and interdisciplinary work in developing impactful work.

Strategically publishing, the research should be aligned with the widely cited themes of leadership, organizational behavior, and sustainable practices, which can significantly increase visibility and the potential for citation. Policymakers and practitioners can use these findings to incorporate green strategies into performance and talent management systems. In the future, the research needs to be geared towards globalizing GHRM and ESE principles by extending to underrepresented geographies and sectors to improve environmental and organizational performance.

Table 4. Top Authors table

No.	Author(s)	Title	Source Title	TC	C/Y
1	Singh, S. K., Del Giudice, M., Chierici, R., & Graziano, D. (2020)	Green innovation and environmental performance: The role of green transformational leadership and green human resource management	Technological Forecasting and Social Change	1246	207.67
2	Kim, Y. J., Kim, W. G., Choi, H. M., &	The effect of green human resource management on hotel employees' eco-friendly behavior and environmental performance	International Journal of Hospitality Management	772	110.29

	Phetvaroon, K. (2019				
3	Roscoe, S., Subramanian, N., Jabbour, C. J., & Chong, T. (2019	Green human resource management and the enablers of green organisational culture: Enhancing a firm's environmental performance for sustainable development	Business Strategy and the Environment	598	85.43
4	Zaid A.A.; Jaaron A.A.M.; Talib Bon A. (2018)	The impact of green human resource management and green supply chain management practices on sustainable performance: An empirical study	Journal of Cleaner Production	536	67.00
5	Ren, S., Tang, G., & E Jackson, S. (2018)	Green human resource management research in emergence: A review and future directions	Asia Pacific Journal of Management	517	64.63
6	Rehman, S. U., Kraus, S., Shah, S. A., Khanin, D., & Mahto, R. V. (2021)	Analyzing the relationship between green innovation and environmental performance in large manufacturing firms	Technological Forecasting and Social Change	495	99.00
7	Masri, H. A., & Jaaron, A. A. (2017)	Assessing green human resources management practices in Palestinian manufacturing context: An empirical study	Journal of Cleaner Production	427	47.44
8	Chaudhary R. (2020)	Green Human Resource Management and Employee Green Behavior: An Empirical Analysis	Corporate Social Responsibility and Environmental Management	380	63.33
9	Anwar N.; Nik Mahmood N.H.; Yusliza M.Y.; Ramayah T.; Noor Faezah J.; Khalid W. (2020)	Green Human Resource Management for organisational citizenship behaviour towards the environment and environmental performance on a university campus	Journal of Cleaner Production	372	62.00
10	Guerci M.; Longoni A.; Luzzini D. (2016)	Translating stakeholder pressures into environmental performance – the mediating role of green HRM practices	International Journal of Human Resource Management	371	37.10

Note: TC=total number of citations; C/Y= citation per-year

Top Institutions

Table 5 shows the concentration of research work in GHRM and ESE as indicated by the geographical and institutional focus of scholarly efforts and the leading institutions in these fields. The Superior University,

Lahore, has the most publications, 14 (4.22%), followed by the Taylor University Malaysia (2.71%), and a group of other Malaysian institutions, including the Universiti Sains Malaysia, Universiti Malaysia Terengganu, Universiti Utara Malaysia, and Universiti Putra Malaysia. This is a trend that demonstrates the relevance of Malaysian higher education institutions in the development of research that is sustainability-related, especially in the aspects of green practices, human capital development and sustainable management.

Table 5. Top institutions

No	Institution	TP	%
1	The Superior University, Lahore	14	4.22%
2	Taylor's University Malaysia	9	2.71%
3	Universiti Sains Malaysia	8	2.41%
4	King Faisal University	8	2.41%
5	Universiti Malaysia Terengganu	8	2.41%
6	Universiti Utara Malaysia	7	2.11%
7	Universiti Putra Malaysia	6	1.81%
8	Qatar University	6	1.81%
9	Iqra University	6	1.81%
10	Sunway University	6	1.81%

The finding indicates a regional focus in GHRM and ESE research, which could be due to national policy priorities, institutional research incentives, and issues about climate change and industrial development in the region. This institutional clustering has a strategic base of regional cooperation, benchmarking, and capacity building, especially between universities in Southeast Asia and the Middle East. Moreover, institutions such as King Faisal University and Qatar University show greater involvement in the Gulf countries, which means increasing global interest in sustainable development in various economic conditions.

Such strategic steps can include developing international research collaborations, joint grant submissions, and disseminating research in international journals with a high impact on improving the global profile and citation rate. Institutions yet to be top publication producers can apply this knowledge to determine working partners and invest in concentrated research groups or centers of excellence. Also, these results can guide policymakers to develop funding policies and academic-industry alliances to further institutionalize sustainability in higher education research agendas.

Top Countries

The distribution of the scholarly output across the globe is shown in Table 6, and it demonstrates the top countries in terms of their contribution to GHRM and ESE-related research. The statistics reflect a high presence of Asian nations, with Pakistan being the most fruitful nation with 78 publications (23.49%), China (18.67%), Malaysia (18.37%), India (12.95%), Saudi Arabia (9.94%), and Indonesia (9.34%). This Asian concentration implies a regional priority in GHRM and ESE concerns, probably due to the rapid industrialization, environmental issues, recycling and energy saving, the role of self-efficacy in providing a sense of hope and empowerment to address climate change, and how the interventions can be developed to help individuals have more environmental self-efficacy and the growing involvement of sustainable development goals (SDGs) into the national research agenda.

Table 6. Top countries

Country	Continent	TP	%
Pakistan	Asia	78	23.49%
China	Asia	62	18.67%
Malaysia	Asia	61	18.37%
India	Asia	43	12.95%
Saudi Arabia	Asia	33	9.94%
Indonesia	Asia	31	9.34%
France	Europe	24	7.23%
United Kingdom	Europe	24	7.23%
Australia	Oceania	16	4.82%
Italy	Europe	14	4.22%

The fact that European countries such as France, the United Kingdom, and Italy, as well as Australia, are present shows that the field continues to have global significance. They, however, contribute comparatively less than their Asian counterparts, which might be because of a change in research momentum to the emerging and developing economies. It may be explained by the fact that there is an urgent need for sustainable innovation, regulatory changes, and green economic shifts in the Global South.

This trend is strategically indicating that the Asian countries, particularly Pakistan, China, and Malaysia, are emerging as major centers of sustainability research. These regions can use their research power to shape the international dialogue, secure international funding, and develop sustainable policy models. In addition, the increasing scholarly production in the developing economies introduces the prospect of Southeast collaborations, knowledge sharing, and co-development of localized sustainability solutions. High-performing countries should focus on high-impact journals, enhance interdisciplinary collaborations, and research capacity-building to stay in the game and remain relevant worldwide. Further, strategic partnerships with the most significant European and Oceanic institutions can extend their research impact globally and further increase the comparative worth of their sustainability innovations.

Author Keywords

The visualization of the co-occurrence of the author keywords created with VOSviewer provides an informative picture of the development of the thematic map in the research fields of GHRM and ESE during the last decade. Figure 3 shows clear sets of keywords that represent primary themes, new domains, and future research directions.

The term “green human resource management” emerges as the most prominent, underscoring its foundational significance. Key concepts such as “sustainability,” “green innovation,” “green HRM practices,” and “pro-environmental behavior " are closely linked, reflecting a central research focus on aligning HR strategies with environmental objectives (Ahmad et al., 2021; Bhardwaj et al., 2025).

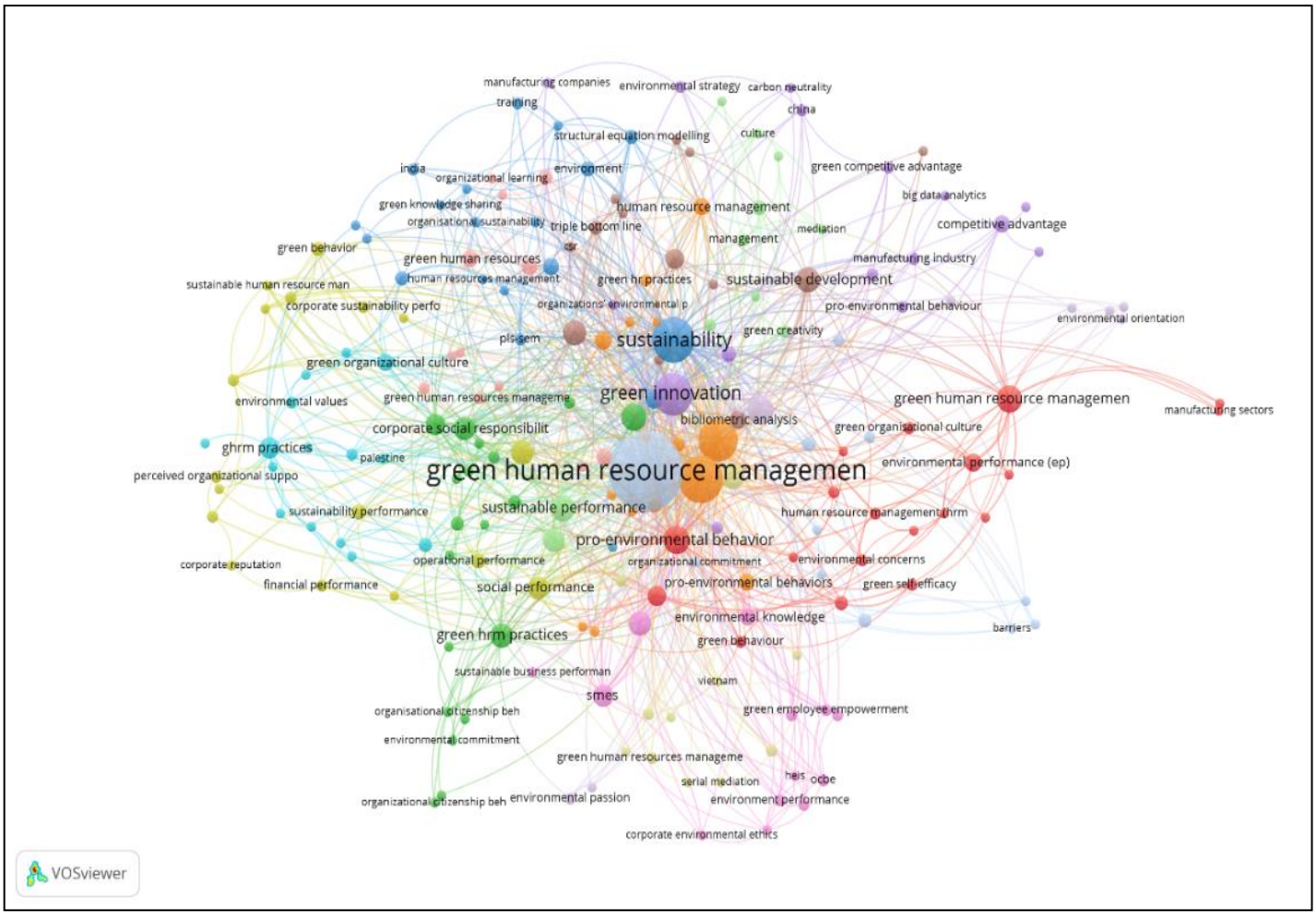

Figure 3. Author Keywords

One of the prominent thematic clusters is devoted to green innovation and sustainable development, where GHRM can provide an efficient approach to sustainability driven by innovations. Scholars emphasize that such activities as green recruitment, training, and rewards foster the culture of innovation, which aligns the internal HR potential with the environmental needs (Shahzad et al., 2023). The other important group is the cluster including the concepts of "pro-environmental behavior" and "environmental self-efficacy", where the concept of ESE plays the role of a moderating or mediating variable in the link between the GHRM efforts and environment-responsible behavior, which illustrates the psychological underpinnings of sustainable behaviors.

Other clusters include such terms as "organizational commitment", "environmental knowledge", and "corporate social responsibility". They are indicators of the multi-level interests of the field in terms of individual, organization, and social levels. CSR and GHRM intercept how ethical values affect employee environmental engagement (Aukhoon et al., 2024). Newer terms such as "SMEs", "manufacturing sectors", and "big data analytics "have emerged, which means an increased interest in high-impact sectors and data-driven HRM solutions. The mapping generally identifies that GHRM research is at an ab initio phase in which researchers have attempted to set up the bare ground in studies. However, the latest studies cover more complex individual organization dynamics such as ESE.

Co-citation Author

The study of GHRM and the ESE has now in the last ten years matured into a multidisciplinary body of work. As is shown in the co-citation map (Figure 4), there are a few clusters of authors, which are interconnected with one another and represent different research interests. The red group with researchers as Ramayah T., Yusliza M.Y., and Sarstedt M. has brought out the faces of the psychology of GHRM or the incorporation of ESE into the organizational environment. They offer empirical evidence of mediating effects of green climate and efficacy beliefs of employees to engage in sustainable behaviors.

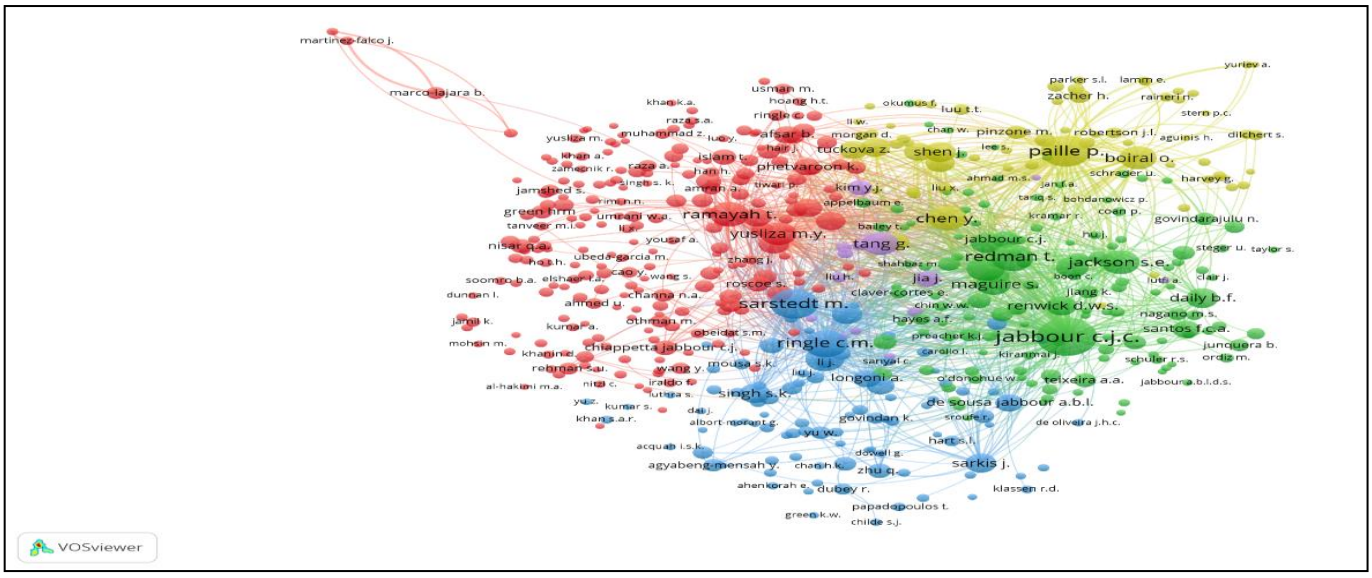

Figure 4. Co-citation Author

The green cluster, headed by scholars like Jabbour C.J.C., Redman T., Jackson S.E., and Renwick D.W.S., presupposes the strategic approach to GHRM. The theory of Dynamic Capabilities and Resource-Based View (RBV) forms the foundation of this cluster, and the GHRM is conceptualized as a tool to align human capital towards the environmental objectives and establish competitive advantage and innovation. Meanwhile, the yellow cluster connects environmental psychology to GHRM because scholars, like Paille P., Boiral O., and Zacher H., focus on the significance of ESE as one of the key mediators in provoking voluntary green behaviours based on the Social Cognition Theory formulated by Bandura. The blue group, which includes researchers like Ringle C.M., Hair J.F., and Sarstedt M., with its contribution to methodology seeming to be of an advanced level, reinforces the empirical strength of the discipline, i.e., SEM and PLS-SEM. The new domains are cultural and contextual elements and exploration research on geographically underserved regions. This kind of theorized research focuses on the embolishment and pollution of behavioral, strategic, and rational thinking, and more research is expected to focus on the consideration of the digital workspace, green leadership, and Industry 4.0.

Thematic Trends

Thematic visualization of bibliographic coupling shown in Figure 5 displays the thematic patterns and the changing research frontiers in the fields of GHRM and ESE. With the help of VOSviewer mapping, this visual chart reveals how key themes have been interconnected during the last decade creating a dual-core system that represents both organizational management strategies and the broader imperatives of sustainability. The map is split into two major clusters: one composed of management-concept-dominated ideas (green cluster) and the other composed of macro-environmental and policy-driven ideas (red cluster), and the results are divided into thirteen themes. Moreover, Table 6 briefly addresses the cluster, keyword extraction, and themes.

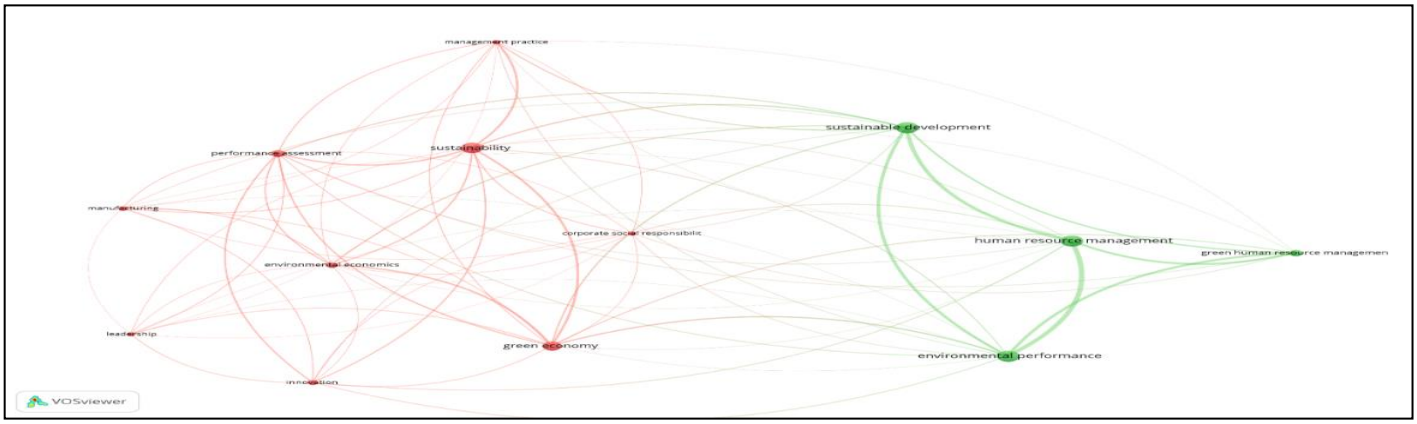

Figure 5. Thematic Trends

Table 6. Cluster, Keywords word extraction and Themes

Cluster	Key Word Extraction	Themes
Cluster 1 (Red)	management practice, best practices, strategic management, management systems, organizational strategy, operational excellence, performance management, business strategy, decision-making, efficiency, process improvement, sustainability management	Management Practices
	sustainability, sustainable practices, ecological responsibility, resource conservation, long-term value, environmental stewardship, triple bottom line, sustainability strategy, resilience, sustainable innovation, climate action, carbon neutrality	Sustainability
	corporate social responsibility, CSR, stakeholder engagement, ethical behavior, community involvement, social impact, corporate ethics, sustainability reporting, accountability, philanthropy, transparency, governance	Corporate Social Responsibility
	green economy, green growth, green investments, eco-innovation, green jobs, green transition, low-carbon economy, ecological economics, clean industries, green policy, circular economy, sustainable consumption	Green economy
	innovation, eco-innovation, technological innovation, green innovation, R&D, disruptive innovation, innovation strategy, sustainable technology, creative thinking, product development, digital transformation, environmental innovation	Innovation
	leadership, sustainable leadership, transformational leadership, green leadership, strategic leadership, environmental leadership, ethical leadership, visionary leadership, change leadership, responsible leadership, managerial capability, governance	Leadership
	environmental economics, green finance, carbon pricing, ecological valuation, economic instruments, market-based solutions, environmental policy, climate finance, cost-benefit analysis, sustainability economics, externalities, emissions trading	Environmental economics
	manufacturing, green manufacturing, sustainable production, eco-efficiency, lean manufacturing, clean technology, environmental management systems, life cycle analysis, resource optimization, production systems, industrial ecology, waste reduction	Manufacturing
	performance assessment, performance metrics, sustainability indicators, benchmarking, KPIs, evaluation, efficiency assessment, green performance, scorecards, auditing, monitoring, environmental indicators, ESG performance	Performance assessment
Cluster 2 (Green)	sustainable development, SDGs, sustainability goals, long-term planning, integrated development, intergenerational equity, sustainability transition, development planning, environmental justice, capacity building, inclusive growth, sustainable livelihoods	Sustainable development
	human resource management, HRM, talent management, workforce planning, employee development, training, recruitment, HR practices, organizational behavior, HR strategy, labor relations, performance management	Human resource management

	green human resource management, GHRM, green training, environmental awareness, sustainable HRM, green recruitment, green performance appraisal, green rewards, employee environmental behavior, eco-consciousness, environmental motivation, green workplace	Green human resource management
	environmental performance, pollution control, emissions reduction, environmental outcomes, resource efficiency, environmental KPIs, carbon footprint, waste reduction, eco-efficiency, environmental compliance, sustainability performance, water conservation	Environmental performance

DISCUSSION

This paper is a systematic bibliometric study of the GHRM and ESE research, and it highlights a dynamic and interdisciplinary intellectual structure. The results answer the three research questions and provide a deep insight into the developmental pathway, thematic orientations, and conceptual intersections that define this emerging field.

In RQ1, the trend review of publications shows a significant rise in scholarly interest after 2020, which is associated with the worldwide demands of corporate sustainability and employee involvement in environmental policies. The upsurge can be attributed to the paradigmatic change observed by Chaudhary (2020) and Kim et al. (2019), where GHRM is no longer regarded as a marginal HR activity but a transformative enabler of organizational change. The increased number of publications in high-impact journals like the Journal of Cleaner Production and Sustainability (Switzerland) proves the validity of GHRM-ESE as a fundamental research field. The geographical focus of the studies in Pakistan, Malaysia, and China validates the previous assertions of Naz and Haider (2023) that GHRM is becoming increasingly popular in developing economies to address the risks of industrialization on the environment. However, as Musaddiq et al. (2024) state, such contributions are usually inconsistent in their theoretical foundations, which this study aims to remedy by integrating the fractured literature in bibliometric coupling.

As the answer to RQ2, the keyword co-occurrence and thematic mapping identified two prevailing streams of research: a macro-strategic one with sustainability, CSR, and green economy; and a micro-psychological one with ESE, green behaviors, and HR practices. This bipolar framework backs the view that Roscoe et al. (2019) expressed that sustainable change should be considered in systemic and behavioral terms. It is important to note that the study establishes ESE as a consequence of green HR practices and as a psychological variable that mediates how HR efforts find their way into pro-environmental behavior. This aspect has received little attention in the existing bibliometric studies (Ahmad et al., 2021). The value of this contribution is original in integrating the knowledge of different disciplines, linking environmental psychology and organizational behavior, and providing a comprehensive perspective of how HR practices engage employee-level drivers of sustainability.

In RQ3, it is revealed that the intellectual landscape of the field is surrounded by four interconnected clusters of authors, namely behavioral psychology (e.g., Anwar et al., 2020), strategic management (e.g., Renwick et al., 2016; Jabbour & Renwick, 2020), environmental leadership (e.g., Singh et al., 2020; Roscoe et al., 2019), and methodological rigor (e.g., Ringle et al., 2020; Shoaib et al., 2021). This confirms what Farrukh et al. (2023) and Shahzad et al. (2023) observe regarding the maturing character of GHRM research that is shifting to move beyond case studies to more theory-based models and empirical testing. The present research is innovative in presenting ESE as a conceptual crossroad that links these clusters into one, referencing Bandura's Social Cognitive Theory (SCT) and the RBV by Barney in 2001. Consequently, it preconditions the further theoretical developments of the focus on the psychological facilitators of green transformation, a field that has been scattered in research.

In synthesizing these insights, this research paper adds a distinctive bibliometric synthesis that traces trends and conceptualizes GHRM and ESE as mutually reinforcing constructs to the sustainability-based HRM paradigm. Although earlier investigations (e.g., Miah et al., 2024; Anwar et al., 2020) focused on the isolated models of ESE, the proposed study will provide an original integrative framework that will show how environmental

efficacy beliefs can be both antecedents and consequences of GHRM practices. Furthermore, this study establishes a research gap in empirical cross-sector and cross-cultural validations and recommends increased longitudinal and experimental studies to determine causality and generalizability.

To sum up, this discussion again confirms that the convergence of GHRM and ESE became a theoretically informed, strategically oriented, and globally engaged domain. The study's novelty is that it is a systematic and conceptually advanced mapping, making ESE a psychological infrastructure essential in operationalizing green HRM at individual, organizational, and policy levels. Future studies should be aimed at optimizing this association with the help of interdisciplinary theories, broadening the geographical range of the samples, and immersing the digital transformation trends to increase green innovation and employee empowerment.

Implications of the Study

The following subtopics discuss the implications of the study:

Theoretical Implication

Theoretically, the study leads to knowledge on how environmental psychology, namely self-efficacy, interacts with the HRM strategies to affect sustainable behaviors. The placement of ESE in the context of GHRM allows the research to introduce an alternative lens through which the pro-environmental organizational behavior can be viewed. It confirms Bandura's SCT in the GHRM environment. It supplements Barney's RBV because it is based on the argument that ESE can be a strategic intangible asset that leads to sustainable competitive advantage when created with specific HR practices. Moreover, the research proposes the necessity of the creation of integrative models that merge leadership, green culture, and psychological enablers in order to describe the dynamics of greening in organizations in a comprehensive manner.

Policymaker Implications

Policy-wise, this research would require the national and regional governments to incorporate the principles of GHRM and ESE into the national sustainability policies. The policymakers ought to create incentives to make the private and governmental institutions implement certified practices of GHRM and start upskilling programs in environmental competencies and self-efficacy. Since the existing studies focus on regional, particularly in Asia, the knowledge exchange and South-South cooperation can be viewed as a strategic opportunity. Moreover, the research indicates that the current labor policies should be changed by moving away from compliance-based models, where employees are regarded as active participants in environmental performance.

Managerial implications

To practitioners, this research highlights that it is as important to develop the environmental capabilities of the employees as it is to have formal sustainability policies. The HR managers should concentrate on the job design, incorporating green values, appraisal systems that recognize eco-behavior, and training that increases environmental confidence. The top and middle management should also establish psychological safety so that employees become ready to experiment with green initiatives without fear of failure. The growth of ESE needs to be tracked using digital tools and HR analytics, and the individual results must be integrated with the corporate sustainability objectives. Finally, the environmental change can be regarded as an open-ended and ongoing organizational process, which is not just technology- or policy-driven, but people-powered through human capital.

Limitations and future study direction

Even though this conceptual representation of GHRM and ESE is strong, it is characterized by numerous weaknesses. Being relatively rigid methodologically, bibliometrics and SLR restrict the study to peer-reviewed journal articles in the Scopus database. This weakness does not have the potential contribution that can be used on non-indexed material in government reporting, grey sources, and local publications, particularly in developing countries where the GHRM practice is picking up momentum.

The other limitation is based on the keyword search strategy, which was limited to article titles only. Although it guaranteed a high level of relevance, it could have missed interdisciplinary studies in which GHRM and ESE are the central topics but not mentioned in the titles (Chaudhary, 2020). Also, co-citation and keyword co-occurrence are valuable in providing structural data. However, they are not sensitive and context-sensitive to provide the relationships that determine how ESE operates in organizational and cultural contexts. Mixed-methods approaches should be used as future research, such as bibliometric analysis and qualitative methods, where HR professionals may be interviewed and longitudinal case studies conducted within different sectors. Since there is a regional variation in academic output and methodological sophistication, cross-cultural research is also necessary.

CONCLUSION

The article offers an innovative bibliometric mapping of GHRM and ESE, which shows a decade of intellectual development, emerging trends, and conceptual overlaps. The study answers three important questions regarding publication dynamics, thematic evolutions, and intellectual architecture of the field by combining bibliographic coupling, keyword co-occurrence, and co-citation analysis. The results indicate that GHRM and ESE have moved out of the periphery to become core organizational sustainability drivers, particularly after 2020. This development highlights the fact that there is an increased academic consensus that sustainable organizational change should involve systemic HR interventions and psychological empowerment processes like ESE. The dual nature of the discipline is indicated by the rise of two strong research clusters, strategic sustainability themes and psychological behavior themes.

It is important to note that the study presents an innovative integrative framework that places ESE as a conceptual bridge between green HR practices and green behaviors of employees. This observation enhances theoretical frameworks in HRM and environmental psychology and establishes the basis of a new breed of interdisciplinary studies that integrates behavioral science and organizational strategy. The research offers a solid academic framework through which researchers, policymakers, and practitioners can support people-oriented sustainability agendas. It promotes the generation of theory-based, empirically tested models considering institutional frameworks and individual agency. In such a way, the study has a crucial role in the intellectual enrichment and strategic implementation of GHRM-ESE in the quest to achieve sustainable organizational transformation.

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