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Article

Mapping Research Trends and Thematic Structure of Green Human Resource Management: A Bibliometric and Scientometric Review

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Abstract: This study presents a bibliometric and scientometric analysis of Green Human Resource Management (GHRM) research using publications indexed in the Web of Science Core Collection. Following PRISMA 2020 guidelines, 258 studies published between 2008 and 2025 were examined using Biblioshiny (R) and VOSviewer. The analysis identifies steady growth in research output, with a sharp rise in publications and citations after 2019. China, Pakistan, India, and Malaysia are the leading contributors, supported by productive institutions such as Edith Cowan University and highly cited authors like Feng Taiwen and Rehman Shafique Ur. Citation metrics (ACPP and PEI) show increasing research influence, particularly from 2019 to 2024. Keyword co-occurrence and thematic analyses reveal core themes centered on performance, sustainability, green intellectual capital, and HRM. Overall, the study maps the intellectual structure and thematic evolution of GHRM, offering key insights and directions for future research.

Keywords: Green HRM, Scientometric, Biblioshiny, VOSviewer, PRISMA, Network visualisation, Citation

1. INTRODUCTION

Sustainable practices and policies are crucial in mitigating environmental degradation by fostering innovation, promoting resource management, and enforcing regulations (Singh & Dwivedi, 2025). These approaches not only address immediate environmental issues but also lay the groundwork for long-term ecological resilience (Vishvas, 2024). Human resource management practices are significantly reshaping employee engagement, driven by technological advancements, ethical considerations, and strategic alignment with sustainability goals (Bodaci, 2025) Green human resource management (Green HRM) is a new, evolving concept in the field of business, shifting its focus from a conventional financial structure to a capacity-based system, ready to explore the green economic facets of business as the corporate world goes global (Peerzadah et al., 2018). Green HRM fosters a culture where employees are actively involved in sustainability efforts, leading to increased commitment and productivity (Atul Kumar, 2024). Organizations that prioritize sustainability are more likely to attract and retain top talent, as employees increasingly seek employers with strong environmental values (Jain, 2023). Key components of Green HRM include eco-friendly human resources initiatives like video recruitment, teleconferencing, recycling programs, and remote work policies (Atul Kumar, 2024).

There has been a notable rise in GHRM research after 2010 (Verma et al., 2024) (Akhtar et al., 2023) and gained traction in various industries, with bibliometric studies identifying key themes and practices (Kaith & Sachdeva, 2024;

Sungaile & Stankeviciene, 2024). Scientometrics and Bibliometrics, the two powerful metrics in the discipline of information and library science used to assess the trajectory of scientific research. (Li et al., 2021) (Grinev, 2019). Scientometrics apply quantitative methods to analyze and visualize scientific literature from bibliographic data to reveals intellectual structure of a research domain and highlights emerging themes (Lim et al., 2024; Pabreja et al., 2025). Bibliometric analysis employs metrics such as publication output, citation counts and co-authorship patterns to get an insight about the productivity, influence and collaboration across scientific disciplines (Lazarides et al., 2025). Continuous bibliometric assessments can enhance the quality of research outputs by ensuring alignment with best practices (Cabezas-Clavijo & Torres-Salinas, 2021). So, this study is to analyse existing literature with the use of bibliometric data and scientometric methods to highlight underexplored areas, guiding researchers toward new opportunities and preventing redundancy.

This study endeavours to answer the following research questions (RQs).

RQ1*: What is the current state of scholarly publications on Green HRM?*

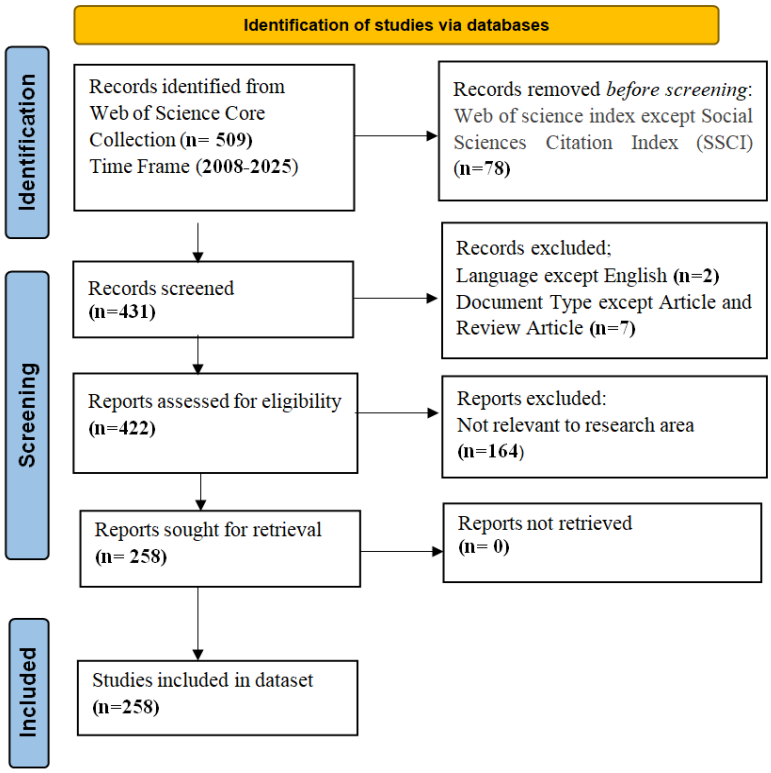
RQ 2*: What is the Average citation per paper and publication efficiency index* associated with scholarly works related to Green HRM?

RQ3*: What are the prevailing trends in keyword occurrence and thematic trend within Green HRM research?*

2. METHODOLOGY

2.1. Data Source and Inclusion

The present research employed the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) approach to identify and screen studies related to Green Human Resource Management (GHRM). The PRISMA checklist 2020 is used to ensure literature analyses and meta-analyses are reported with transparency and completeness (Page et al., 2021) The literature search was conducted using the Web of Science (Core Collection) database. The following keywords and their combinations were used in the search strategy: “Green Human Resource Management”, “Green Intellectual Capital,” “Sustainable Human Resource Management,” and “Green HRM Practices”. The search conducted within the topic field yielded 509 records relevant to the broader domain. Through a thorough cleaning process, identified and eliminated 251 irrelevant documents not pertinent to the topic and remaining 258 documents included in the data set. The data collected from the web of science database as then exported into BibTeX document for Biblioshiny and plain text for VOSviewer for bibliometric and scientometric analysis. The data exported on 9th November 2025.



(Source: PRISMA flow diagram)

Figure 2.1: PRISMA Flow Diagram of the Data Search and Inclusion

2.2.Research Method

The research method of this study follows a systematic process of data collection, screening, and refinement, resulting in a validated dataset for bibliometric and scientometric analysis. Bibliometrics focuses on the statistical analysis of written publications, assessing aspects such as production, dissemination, and usage of information (Demir et al., 2025; Sahu & Jain, 2026), while scientometrics extends this analysis to the broader context of its impact on society and policy-making (Pradhan, 2016). Publication data were retrieved from the Web of Science Core Collection to ensure high-quality and peer-reviewed sources. Bibliometric and scientometric indicators, supported by network visualization and statistical techniques (Mondal, 2025), were applied to analyse the extracted literature. Biblioshiny (R environment) and VOSviewer served as the prominent tools to assess publication patterns, research productivity, thematic structures, intellectual foundations, and collaboration networks (Gutierrez-Salcedo et al., 2018) related to Green Human Resource Management (GHRM). For detailed quantitative analysis of the bibliometric data Microsoft excel is used. The bibliographical data were exported to CSV excel file and tabulated using Microsoft Excel Spreadsheet. Overall, this methodological approach offers a structured and evidence-based evaluation of the field's knowledge development. Table 2.1 presents an overview about the dataset used for bibliometric analysis.

Table 2.1: Data Set Details

Timespan	2008:2025	Author's Keywords (DE)	864
Sources (Journals, Books, etc)	70	Authors	921
Documents	258	Authors of single-authored docs	24
Annual Growth Rate %	28.5	Single-authored docs	27
Document Average Age	2.31	Co-Authors per Doc	3.93

Average citations per doc	61.81	International co-authorships %	46.51
References	14474	article	215
Keywords Plus (ID)	593	Review article	37

(Source: BiblioshinyR)

3. Analysis and Results

3.1 The Current State of Scholarly Publications on Green HRM.

To assess the current state of scholarly publications on Green HRM, the analysis focuses on key bibliometric dimensions such as *annual scientific production and its exponential growth rate, country-wise contributions, institutional productivity, authors productivity and influential source*. These dimensions collectively help to derive the current state of publication on the topic.

3.1.1 Annual Scientific Production and Exponential Growth Rate of Scholarly Publications.

Annual Scientific Production is the output of research activities measured primarily through publications, and other scholarly contributions within a year (Lee, 2015). Exponential Growth Rate (EGR) means the rate at which the rate of changes rapidly over time. Understanding the exponential growth rate of publication trends is significant as it provides insights into the dynamics of scientific progress research outputs and this growth pattern reflects broader technological and societal changes, influencing how knowledge is disseminated and utilized (Daruka, 2014). Exponential growth rate formula often used in scientific modelling is derived from, $t = P_o e^{rt}$

So, **Exponential growth rate**

$$= \frac{\left(Ln\left(\frac{p_t}{p_0}\right)\right)}{t}$$

Where,

P_t = the final number of publications,
P_0 = the initial number of publications
e = Euler's number (≈2.71828),
r = Continuous Growth rate, t = time

Table 3.1: Annual Publication and Exponential Growth Rate of Publication

Sl. No	Year	Articles Published	$\left(\frac{p_t}{p_0}\right)$	$Ln\left(\frac{p_t}{p_0}\right)$	GrowthRate $\frac{\left(Ln\left(\frac{p_t}{p_0}\right)\right)}{t}$
1	2008	1	-	-	-
2	2009	0	0.00	-	-
3	2010	0	-	-	-
4	2011	1	-	-	-
5	2012	1	1.00	0.00	0.00
6	2013	0	0.00	-	-
7	2014	2	-	-	-
8	2015	0	0.00	-	-
9	2016	4	-	-	0.00
10	2017	2	0.50	-0.69	-0.07
11	2018	5	2.50	0.92	0.08

12	2019	10	2.00	0.69	0.06
13	2020	14	1.40	0.34	0.03
14	2021	17	1.21	0.19	0.01
15	2022	39	2.29	0.83	0.06
16	2023	37	0.95	-0.05	0.00
17	2024	54	1.46	0.38	0.02
18	2025	71	1.31	0.27	0.02
	Total	**258**			**0.20**
	Mean				**0.01**

(Source: Biblioshiny R)

>**NP**- Number of Publication

> Publication percentage

$= (\frac{NP}{Total\ Publication} * 100)$

>**TC**- Total citation,

>**ACP**- Average cited publication per number of publications, $(ACP = \frac{TC}{NP})$

Table 3.1 indicate that the exponential growth rate of publications from 2008 to 2025 shows an overall gradual improvement despite early stagnation. The initial years reflect no measurable growth, indicating minimal research activity. As the period progresses, small positive values begin to appear, though the trend remains inconsistent, with a brief decline reflected by the –0.07 rate in 2017. From there, the growth stabilizes with moderate positive increases from 2018 onwards such as 0.08, 0.06, 0.03, and 0.01, showing a slow strengthening of research output. In the final years, the growth rate becomes more consistent (0.00, 0.02, 0.02), indicating a more organized research environment. Overall, the pattern reflects a shift from minimal early activity to steady, structured growth in publication productivity.

3.1.2 Scientific Scholarly Productions of Countries.

The data in the Table 3.2 shows that Green HRM research is highly concentrated in Asia, led by China with 55 publications and 2,105 total citations, followed by Pakistan (35 publications, 588 citations) and India (28 publications, 351 citations), together accounting for over 50 percentage of total research output. Malaysia (25 publications) and Australia (20 publications) also contribute notably, while other regions show limited involvement with lower publication and citation counts. These quantitative disparities highlight a strong regional dominance in Asia and indicate a need for broader international participation to strengthen the global development of Green HRM research.

Table 3.2: Scientific Scholarly Productions of Countries

Country	**NP**	**Publication Percentage**	**TC**	**ACP**
China	55	23.40	2105	38.27
Pakistan	35	14.89	588	16.80
India	28	11.91	351	12.54
Malaysia	25	10.64	374	14.96

Australia	20	8.51	372	18.60
Italy	18	7.66	301	16.72
England	16	6.81	445	27.81
Spain	14	5.96	341	24.36
France	12	5.11	227	18.92
Saudi Arabia	12	5.11	24	2.00

(Source: Biblioshiny R)

3.1.3 Author's Publication Impact

Author's Publication Impact is measured using number of publication, total citation, average cited publication per number of publications, h-index and g-index. The h-index and g-index both indices serve as valuable tools for assessing academic contributions of authors (Vaishya, Vaish, et al., 2025). Jorge Hirsch in 2005 introduced the h-index, it quantifies both the productivity and citation impact of a researcher by identifying the number of papers (h) that have received at least h citations each (Tol, 2009). The g-index measures citation performance by identifying the largest number g such that the top g articles receive at least g^2 citations (Abramo et al., 2010).

Table 3.3: Authors Publication Impact

Author	NP	TC	ACPP	h-index	g-index
FENG TAIWEN	5	99	19.80	5	5
ASIAEI KAVEH	4	437	109.25	4	4
REHMAN SHAFIQUE UR	5	574	114.80	4	5
FANG WEI	3	84	28.00	3	3
MARTINEZ-FALCO JAVIER	3	44	14.67	3	3
NEJATI MEHRAN	3	190	63.33	3	3
SHAFAEI AZADEH	3	190	63.33	3	3
XI MENGJIE	3	84	28.00	3	3
ABDULAZIZ FAHMI OMAR	2	17	8.50	2	2
AFSAR BILAL	2	654	327.00	2	2

(Source: Biblioshiny R)

>**NP**- Number of Publication,
>**TC**- Total citation,
>**ACPP**- Average cited publication per number of publications.

Table 3.3 presents the top 10 most influential authors in Green HRM research, highlighting clear differences in productivity and scholarly impact. Feng Taiwen and Rehman Shafique Ur record the highest publication counts, with the latter also exhibiting the strongest citation influence (TC = 574; ACPP = 114.8). Asiaei Kaveh shows notable

impact as well, achieving 437 citations and a high ACPP despite fewer publications. The leading authors generally hold h-index and g-index values between 3 and 5, indicating consistent research quality.

3.1.4 Scientific Scholarly Productions of Institutions

(Source: Biblioshiny R)

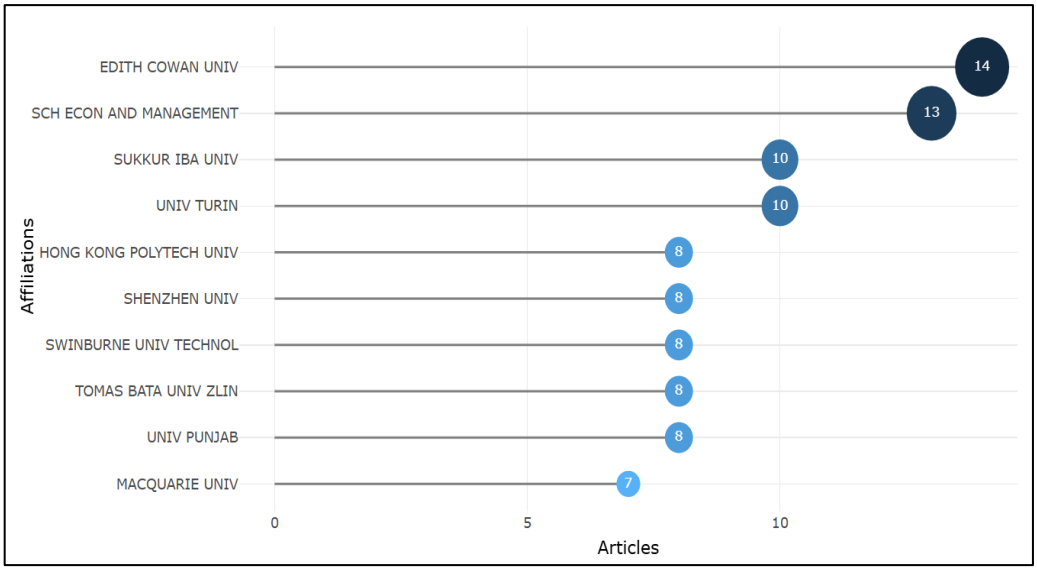


Figure 3.1: Plot on Scientific Productions of Institutions

Figure 3.1 indicates a concentrated distribution of scientific output, with Edith Cowan University producing 14 publications and the School of Economics and Management contributing 13 publications. The remaining institutions like the Sukkur Institute of Business Administration, the University of Turin, The Hong Kong Polytechnic University generated between 8 and 10 publications each, reflecting a relatively balanced level of research productivity among the top ten institutions.

3.1.5 Influential Source of Publication

Table 3.4: Relevant Source Metrics

Source	**NP**	**TC**	**h_index**	**g_index**
Journal of Intellectual Capital	37	863	16	29
Business Strategy and the Environment	22	2324	14	22
International Journal of Manpower	14	1290	13	14
Corporate Social Responsibility and Environmental Management	19	1600	12	19
International Journal of Human Resource Management	10	1369	8	10
Employee Relations	8	357	6	8
Journal of Sustainable Tourism	6	438	5	6
Asia Pacific Journal of Human Resources	6	163	4	6

Business Ethics the Environment & Responsibility	4	103	4	4
Human Resource Management	5	1053	4	5

(Source: Biblioshiny R)

The analysis (table 3.4) of the top 10 relevant sources shows that the Journal of Intellectual Capital leads overall with the strongest combination of h-index, g-index, and publication volume, indicating consistent scholarly influence. Business Strategy and the Environment stands out for achieving the highest total citations despite fewer publications, demonstrating exceptionally high impact per article. Other journals such as *the* International Journal of Manpower *and* Corporate Social Responsibility and Environmental Management also show strong citation performance, reinforcing their importance in sustainability and organizational research. The remaining sources contribute moderate but meaningful influence, highlighting a diverse set of journals that shape the field through both productivity and citation impact.

3.2 The Average Citation per Paper and Publication Efficiency Index Associated with Scholarly Works Related to Green HRM.

3.2.1 The Average Citation per Paper and Publication Efficiency Index

The concept of publication efficiency metrics is used to evaluate scholarly output based on the citation received to the research publication. Guan & Ma 's (2007) work on the publication efficiency index assess research performance through citation emphasizing the importance of quality over quantity in academic publishing.

The formula given by Guan & Ma 's (2007) to calculate publication efficiency index as;

$$PEI = \frac{TNC_i/TNC_t}{TNP_i/TNP_t}$$

Where, TNC_i – Total number of citations in a particular year;
TNC_t - Total numbers of citations for all the years.
TNP_i – Total number of publication in a particular year;
TNP_t - Total number of publications for all the years,

Table 3.5: ***Average Citation per Paper and Publication Efficiency Index***

Year	NP	TC	ACPP	PEI
2008	1	0	0.00	0.00
2009	0	5	-	-
2010	0	7	-	-
2011	1	10	10.00	0.16
2012	1	17	17.00	0.28
2013	0	18	-	-
2014	2	26	13.00	0.21
2015	0	30	-	-
2016	4	39	9.75	0.16
2017	2	64	32.00	0.52

2018	5	81	16.20	0.26
2019	10	265	26.50	0.43
2020	14	621	44.36	0.72
2021	17	1219	71.71	1.16
2022	39	2107	54.03	0.88
2023	37	3120	84.32	1.37
2024	54	4112	76.15	1.23
2025	71	4175	58.80	0.95
Total	**258**	**15916**	**513.81**	**8.33**
Mean			**28.55**	**0.46**

(Source: Biblioshiny R)

>**NP**- Number of Publication
>**Publication %**- Publication percentage (total 258),
>**TC**- Total number of citation

The data in the table 3.5 indicate that a strong upward trend in both research output and citation impact during the period from 2008 to 2025. In the early years (2008–2014), annual publications remained low, ranging from 0 to 2 papers, with total citations increasing slowly to 26 citations by 2014. A significant rise begins after 2016, where publications increased to 4 papers in 2016 and citations reached 39. The most substantial growth occurs between 2019 and 2024, with annual publications rising from 10 papers (2019) to 54 papers (2024). During this period, total citations grew sharply from 265 (2019) to 4,112 (2024). Citation quality metrics also improved: the Average Citation per Paper (ACCP) increased from 26.5 in 2019 to 71.7 in 2021, and the Publication Efficiency Index (PEI) reached its highest values in 2021 (1.162) and 2023 (1.367). Although 2025 recorded the highest output (71 publications), the ACCP decreased to 58.8, and PEI to 0.953, reflecting the typical delay before new papers accumulate citations. Overall, the dataset indicates substantial growth, with totals reaching 258 publications, 15,916 citations, and a mean ACCP of 28.55, demonstrating significant improvement in both productivity and research influence over time.

3.3 The prevailing trends in keyword co--occurrence and thematic clustering within Green HRM research.

The research question was assessed using keyword-occurrence analysis, author-keyword co-occurrence, and a three-field plot linking authors, keywords, and countries. Trending-topic analysis was further applied to capture the evolution of themes in Green HRM research.

3.3.1 All *Keyword Co-Occurrence*.

Co-occurring keywords identified by co-occurrence networks, provides an idea about prevalent theme and a detailed visualization of its interconnectedness (Donthu et al., 2021). Visualizing relationships helps researchers understand the context and relevance of keywords within the field they work in (Catone et al., 2020).

Source: Biblioshiny R)

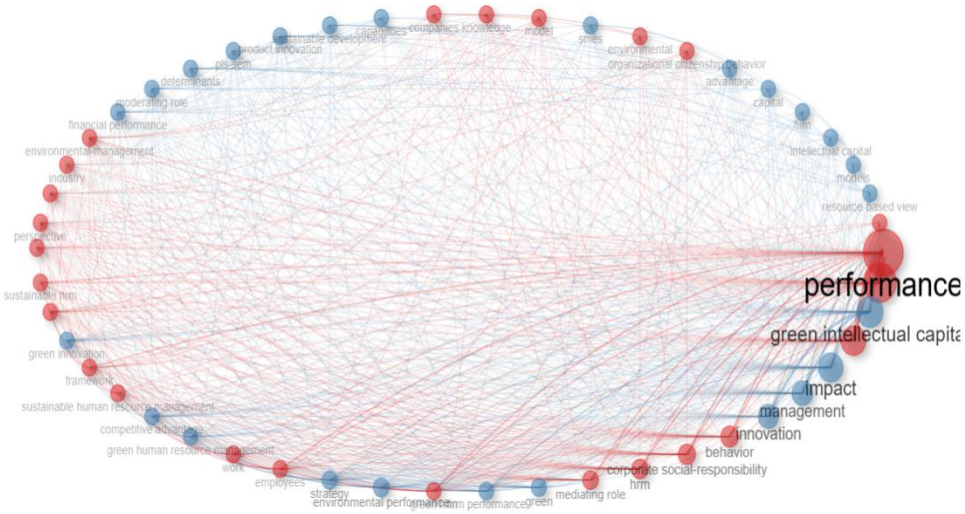


Figure 3.2: Keyword Occurrence Network

The figure 3.2 co-word network shows that performance (betweenness 119.342**,** Page rank 0.069**)** and sustainability (betweenness 73.472**,** Page Rank 0.059**)** which demonstrates its strong role in connecting multiple themes across Green HRM. Concepts such as human-resource management (32.286) and behavior (18.466) play supportive roles, often appearing as connecting ideas related to the mediating role of employees, work practices, and leadership within Green HRM frameworks. Themes like sustainable human resource management, commitment, environmental-management, industry, and companies appear in the network as relevant keywords but exhibit lower connectivity, indicating they are emerging rather than dominant ones.

3.3.2 Author Keyword Co-Occurrence.

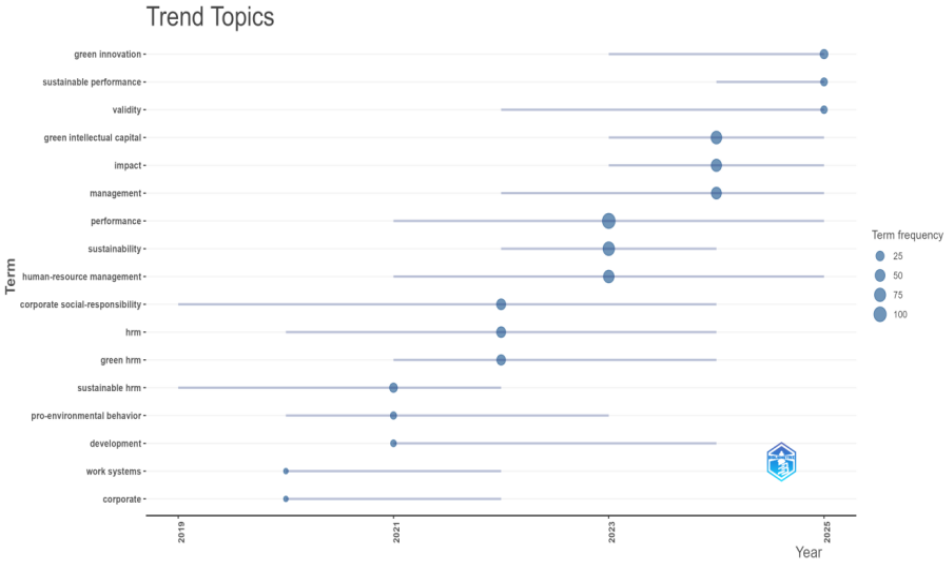
Table 3.6: Author Keywords Co-Occurrence

Keyword	Occurrences	Total linkstrength
Green Intellectual Capital	78	98
Green HRM	31	38
Green Human Resource Management	29	50
Sustainable Human Resource Management	29	19
Sustainability	27	39
Environmental Performance	22	40
Sustainable HRM	22	16
Green Innovation	21	42
Sustainable Performance	13	24
Sustainable Development	12	21
Smes	11	21
Corporate Social Responsibility	10	14

(Source: VOSviewer)

The table 3.6 depicts the top author keyword co-occurrence analysis reveals that that green intellectual capital is the strongest and most influential theme, recording the highest occurrence (78) and highest link strength (98) in the network. Core human resources related terms such as green HRM and green human resource management show moderate but significant connectivity, supporting their role as central research factors. In contrast, sustainability-oriented HR terms like sustainable HRM and sustainable human resource management display lower link strengths (16–19)**,** indicating weaker integration. Performance-related themes such as environmental performance and green innovation—hold mid-level influence, while corporate social responsibility shows the lowest link strength (14)**,** positioning it as a secondary factor within the research structure.

3.3.3 Trending Topic

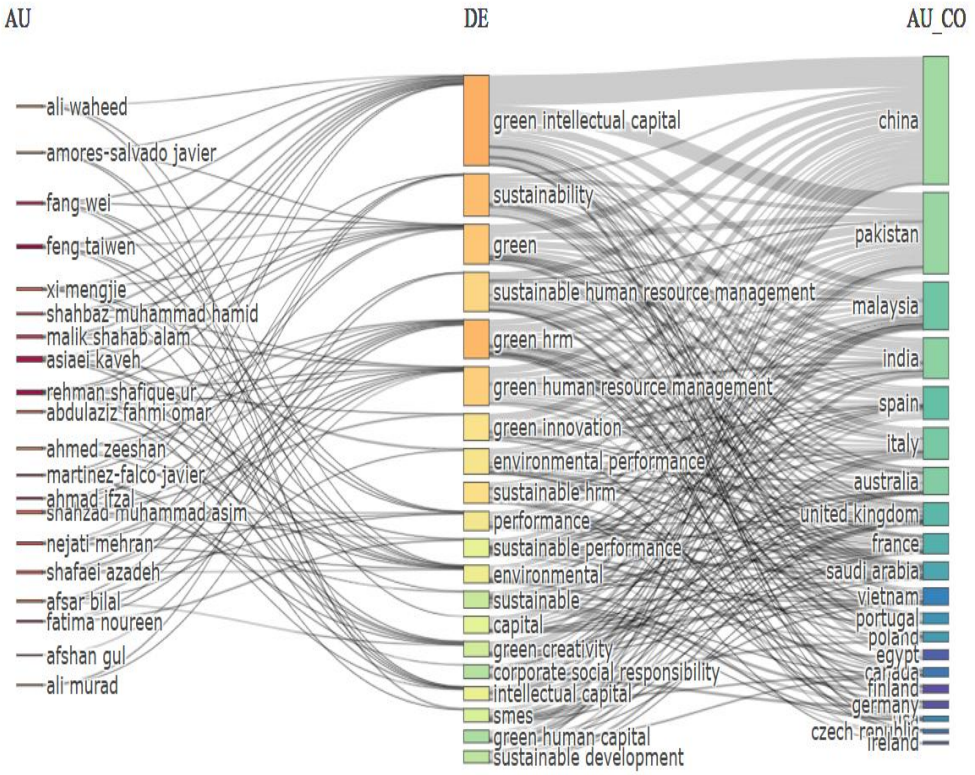


(Source: Biblioshiny R) **Figure 3.3: Trend-Topic Map**

The figure 3.3 shows a clear shift in Green HRM research from broad organizational themes toward more specialised, sustainability-driven areas. Earlier topics such as corporate and work systems gradually gave way to core concepts like sustainability, performance, management, *and* human-resource management around 2022–2023, indicating growing academic focus on linking HRM to environmental and organizational outcomes. In the most recent period (2023–2025), advanced themes such as green innovation, green intellectual capital, and sustainable performance gained prominence, signalling the progression toward strategic and innovation-oriented dimensions.

3.3.4 Three Field plot (Author-Keyword-Country) Analysis

Three field plot analysis is a tool to visualise and explore the relationship among three different elements of bibliometric data. The network visualisation in the three plots highlights the collaborative and thematic relationship between the Author, Keyword, and Country.



(Source: Biblioshiny R)

Figure 3.4: Three Field Plot Author-Keyword-Country

Figure 3.4 the three-field plot (Left side: Author, Middle: Keyword, Right side: Country) shows that central keywords such as performance**,** sustainability**,** green intellectual capital**,** and human-resource management form the core thematic focus of the research. These keywords are strongly linked to prominent authors, including Martinez-Falco Javier**,** Feng Taiwen**,** and Ramiz Shahab Alam**,** indicating their active contribution to these areas. On the country side, China**,** Pakistan**,** India**,** and Malaysia appear as the leading contributors, showing the highest connections to the dominant keywords. Overall, the plot highlights that a concentrated group of authors and countries consistently engage with the key themes shaping the Green HRM and sustainability research landscape.

4. Scope for Future Research

Despite growing scholarly interest in Green HRM, the existing literature reveals several critical gaps. Current studies are geographically imbalanced, with research heavily concentrated in a few Asian countries (Rahman et al., 2024), limiting the global applicability of findings. Behavioural and psychological aspects such as green psychological climate, employee motivation, and organizational culture, remain underexplored, even though they are essential for understanding sustainable HR outcomes. Empirical evidence on the real-world implementation (Md. Shahadat Hossain et al., 2024) and effectiveness of Green HRM is scarce, resulting in limited insight into practical challenges and organisational readiness. Moreover, theoretical integration within sustainability-oriented HR constructs is weak; key concepts such as sustainable HRM, green behaviour, and environmental commitment appear fragmented rather than interconnected.

5. Conclusion

The bibliometric and scientometric review of Green Human Resource Management (GHRM) research offers a comprehensive understanding of publication dynamics, intellectual influence, and thematic development within this

expanding field (Kumar, 2024). The analysis reveals a steady rise in scholarly interest since 2008, with strong acceleration after 2016 and a marked surge in publication output and citation impact between 2019 and 2025. Research productivity is concentrated mainly in Asian countries especially China (EdiNsel & Kara, 2023) supported by influential institutions such as Edith Cowan University and highly cited scholars like Feng Taiwen and Rehman Shafique Ur. Key journals, including the Journal of Intellectual Capital and Business Strategy and the Environment, further shape the academic discourse and dissemination of GHRM-related research.

Citation indicators such as the Average Citation per Paper (ACCP) and Publication Efficiency Index (PEI) reflect the growing maturity and scholarly impact of the field (Vaishya, Gupta, et al., 2025), despite expected citation lags for newer publications. The thematic and co-word analyses reveal a coherent structure centered on performance, sustainability, and green intellectual capital, highlighting the integration of environmental considerations into human resource and organizational strategies. Overall, the review underscores a rapidly developing research domain characterized by rising productivity, expanding international collaboration, and the consolidation of key thematic clusters. These trends indicate not only the growing academic importance of GHRM but also its potential to inform evidence-based organizational practices aimed at enhancing environmental performance. The findings provide a structured foundation for future research, highlighting opportunities for deeper theoretical development, cross-country comparative studies, and sector-specific examinations of sustainable HRM practices.

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