Unveiling the Growth of Green Human Resource Management: A Bibliometric Analysis and Future Research Agenda

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Abstract: *Green Human Resource Management (Green HRM) represents one of the strategic approaches adopted by organizations to address environmental challenges, integrating environmental management practices with broader green strategic initiatives. To deepen scholarly understanding of this domain, it is essential to systematically assess the current state of Green HRM research. Accordingly, this study reviews 616 articles drawn from the Web of Science (WoS) database covering the period 2010–2024, constituting the most comprehensive and up-to-date synthesis of Green HRM literature to date. The findings reveal that although prior research has largely concentrated on Green HRM practices and policies, limited attention has been given to examining Green HRM as an integrated system aligned with organizational strategy. Addressing this gap, the review underscores the relevance of systems theory for understanding how organizations embed green HRM strategy within their business frameworks. Furthermore, the analysis highlights several promising avenues for future research, including the formulation and implementation of Green HRM strategies, the roles of top management and employees, the competencies required of HR professionals, and the congruence between organizations reported green initiatives and their actual practices.*

Keywords: *Green Human Resource Management, Green HRM Strategy, Bibliometric Study, Systems theory, Sustainability*

1. Introduction

Earlier, the success of any business relied solely on promoting economic value. However, for businesses to remain competitive, they now need to minimise ecological footprints and prioritise social and environmental concerns while aspiring for commercial and financial purposes (Govindarajulu & Daily, 2001).

Far from being a mere buzzword, sustainability has taken place as a strategic priority, requiring industry leaders to be mindful of balancing profits with the social and environmental impacts they make. Moreover, a growing generation of environmentally conscious employees positively perceive organisations as environmentally sensitive in their nature of operations Saifulina et al. (2020). Through advertising, well-known companies such as Apple (Apple, 2024) and Nestle (Nestle, 2024) have widely communicated how caring for the environment is an integral part of their strategy and operations.

Being an important function that has a significant bearing on all other management functions, green HRM offers great potential for an organisation to achieve its environmental goals. Hence, HRM practices need to be looked at with a pro-environmental approach to optimise business impact

and competitive edge for consumers and employees. Green HRM is a part of a sustainable HRM approach to the environment (Aust et al., 2019). The term "Green HRM" refers to organizational environmental HRM practices and policies that enable organisations in achieving their goals in an environment friendly way.

Although this field has received recent attention, it is still in the emergent phase. Currently, the field is mature, and sufficient research is warranted to understand its foundational nature and futuristic directions. In order to characterise the composition and help in evolution of Green HRM as a scientific field, the purpose of this study is to equip researchers and human resource managers by organising the knowledge in this field through literature review. To accomplish this, we study the intellectual, conceptual, and social network structures of Green HRM research as well as the dynamical aspects, performance, and evolution of the field using performance analysis and scientific mapping techniques (Trinidad et al., 2021).

Unlike previous reviews, for example, (Amrutha & Geetha, 2020; Bahuguna et al., 2022; Fachada et al., 2022; Faisal, 2023; Mehta, 2023; Mukherji &

Bhatnagar, 2022; Yong et al., 2020) this study provides a comprehensive and detailed analysis of Green HRM scholarship. The 616 articles in this dataset represent the largest collection of papers reviewed in literature on this subject from the Web of Science which is considered a high-quality database (Singh et al., 2021). Considering the rapid growth and rising interest in Green HRM scholarship using the following research questions, this study attempts to analyse the evaluation of Green HRM over the last 14 years.

RQ 1. What is a descriptive overview of the Green HRM field?

RQ 2. What comprises the intellectual base and front of Green HRM research?

RQ 3. How is Green HRM research conceptually structured?

2. Research Methodology

A literature review can help emphasise the knowledge limitations of a study topic and locate prospective research gaps (Tranfield et al., 2003). There are three common types of reviews: systematic literature reviews, bibliometric analyses, and meta-analyses. In this research article, we employ bibliometrics because it allows us to structure a large volume of literature and identify areas for future research (Baker et al., 2020).

The information was gathered from the Web of Science, a database that retrieves articles using search criteria and exported together with metadata, including references, abstracts, and journal information. For bibliometric investigations, Web of Science serves as a common data source since it has better peer review and, as a result, higher quality than Scopus for quantitative analysis.(Bahuguna et al., 2022). We exported data with following keywords- **"Green Human Resource Management" OR "Green HRM" OR "GHRM" OR "Green Human Resource" OR "Green HR"** maximum results came from our first keyword but not to miss any article we used all other related keywords. The results are as follows: 677. For inclusion and exclusion criteria we selected journal articles since they are considered as "certified knowledge" because they undergo an evaluation procedure, which gives the results of reliability (Danvila-del-Valle et al., 2019) thus we included "articles" and "review articles" which are published only in "English" language from year to 2010-2024 by this criteria WOS produced 616 articles which we used for our final analysis. The popularity of bibliometric analysis has greatly increased in business research. First, bibliometric analysis is capable of managing large amounts of scientific data and can unravel relevant patterns, supporting the interpretability and clarity of a particular knowledge domain. Second, scientific databases, such as Scopus and Web of Science, are compatible with the typical tools used to perform bibliometric analysis, such as R software and VOS viewer (Mukherjee et al., 2022). By using intellectual, conceptual, and social network structures, this study attempts to provide valuable insight into how Green HRM has evolved over the past 16 years. The search configuration, identification, and screening processes used in this study are detailed in Table 1.

Table 1 Flowchart outlining the source identification and screening processes.

Database	Web of science
Search category	Topic (Title, Abstract and keyword)
Keyword used	"Green Human Resource Management" OR "Green HRM" OR "GHRM" OR "Green Human Resource" OR "Green HR"
Document Type	Article and Review Article
Language	English
Time Period	2010-2024
Total article identified in the initial search	677
Total articles excluded	61 (Book chapters, conference proceeding and language other than English)
Articles included after synthesis	616 (578 articles and 38 review articles)
Software	R and VOS viewer

(Source: Authors' own creation)

3. Results and Discussion

3.1. What is the descriptive analysis of Green HRM literature?

A descriptive analysis offers valuable insights into research output and development by examining the contributions of the authors, institutions, and countries. It identifies the most prolific or impactful authors, the most cited works, and the leading journals in the field. Monitoring these metrics over time provides researchers with a clear view of the progress of the field.

3.1.1 What are the emerging publishing patterns of Green HRM research?

As previously mentioned, our review dataset contained 616 publications. Table 1 provides the complete information regarding our dataset. Only journal and review articles were included in the dataset. A total number of 1589 authors used 1358 keywords to describe their research. Figure 1 shows the year-wise publication rate of Green HRM research from 2010 to 2023. There has been a gradual rise in the number of publications by 2023, with 196 publications. The current economic environment necessitates that enterprises change their focus to environmental sustainability, which may cause a sudden rise in research output on green HRM (Farrukh et al., 2022). Figure 2 depicts the total publications (TP) per year with blue colour, along with the average number of citations per year with orange colour. The year 2013 saw the most growth in citations, which shows that the article published in this year has gained a lot of attention.
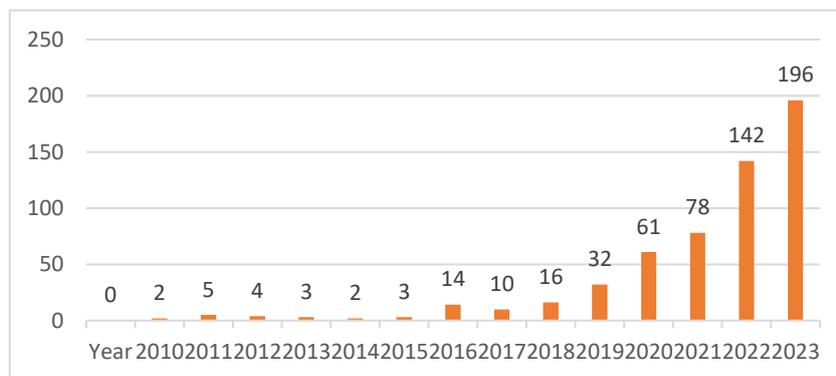

Figure 1 Publishing patterns in Green HRM research
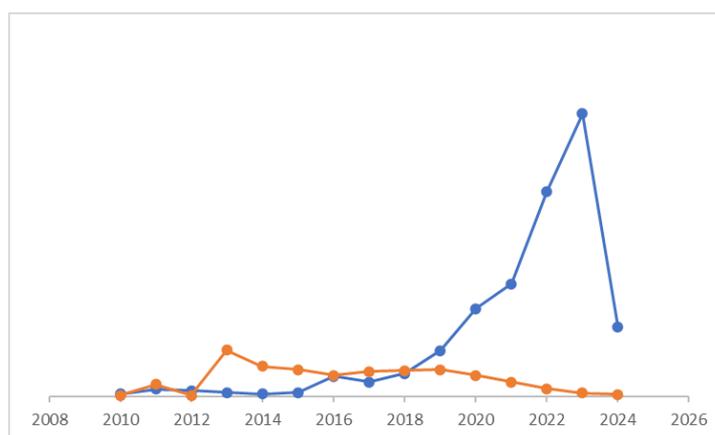
(Source: Authors' own creation)

Figure 2 Evaluation in number of citations per year

(Source: Authors' own creation)

3.1.2 Which countries have made significant contributions to Green HRM research?

Figure 3 shows that China (80), Pakistan (46), and India (40) were the most productive countries, indicating significant international collaboration.

China, Pakistan, and Malaysia led Multiple Country Publications (MCP) with 54, 28, and 18 articles, respectively. This suggests high international collaboration, particularly for China (132 MCP), Pakistan (80 MCP), and Malaysia (50 MCP), compared to their single-country publications (SCP). India shows a strong inclination towards single-country publications, with 61 publications, while China has emerged as a significant player in the global research arena. Not only does China lead in terms of the highest research output but it also garners the most citations, reflecting its influential role in the field.

Figure 4 highlights China as having the highest number of citations (3933), followed by Pakistan (2068) and Malaysia (1983). Despite China's high citation count, Canada is the most influential country based on average citations per year, at 176.7. The United Arab Emirates and Brazil follow with 172.9 and 101 average citations per year, respectively, as shown in Figure 5. highlights China's dominance over the past three years, emphasising its crucial role in global scientific progress.
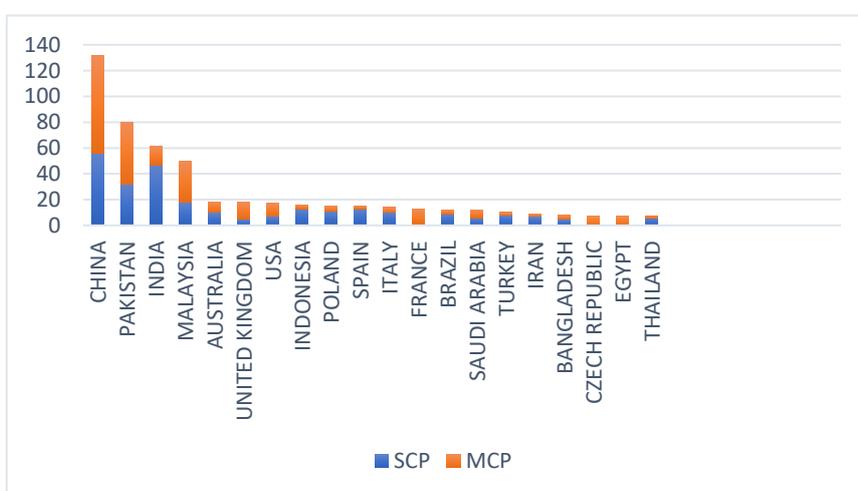

Figure 3 Top 20 most contributing countries
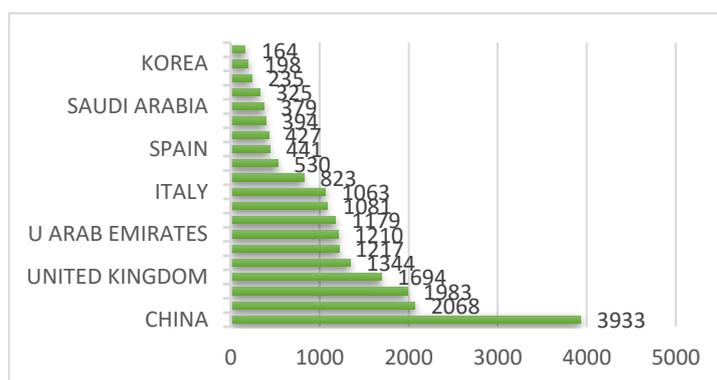
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Figure 4 Countries with the highest citations
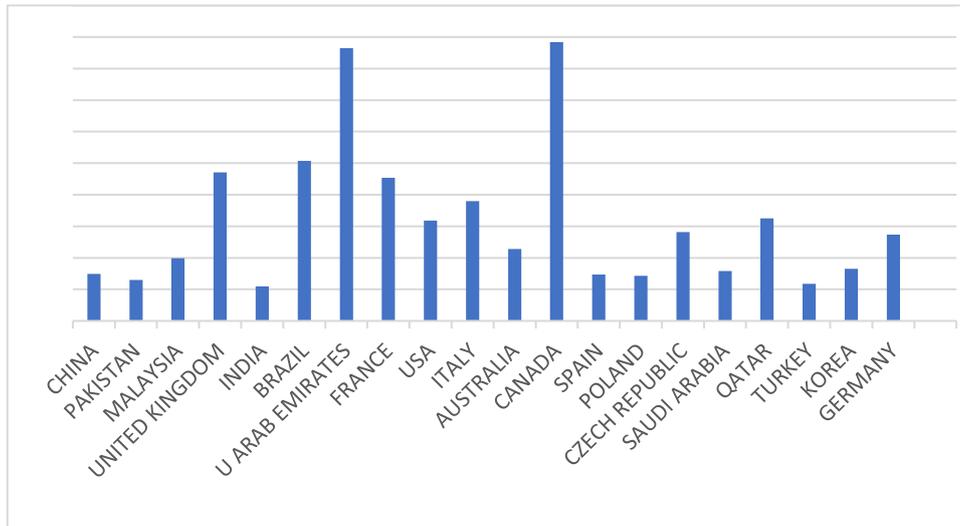
(Source: Authors' own creation)

Figure 5 Top influential organisations

(Source: Authors' own creation)

3.1.3 What are the key publications in the field of Green HRM?

Table 2 Top 15 articles with their local and global citations.

S.NO.	Articles	Local Citations	Global citations
1	Renwick et al. (2013)	449	831
2	(Dumont et al., 2017)	309	530
3	(Kim et al., 2019)	248	451
4	(Tang et al., 2018)	227	328
5	(Jackson et al., 2011)	208	339
6	(Ren et al., 2018)	204	295
7	(Saeed et al., 2019)	204	328
8	(Paillé et al., 2014)	189	449
9	(Roscoe et al., 2019)	176	331
an	(Masri & Jaaron, 2017)	174	262
11	(Pham et al., 2019)	157	308
12	Jabbour and Jabbour (2016)	151	355
13	G(Guerci et al., 2016)	151	230
14	Ahmad (2015)	150	219
15	Singh et al. (2020)	150	698

(Source: Authors' calculations)

The journals that publish highly cited and, hence, significant Green HRM articles are listed in Table 2. The top-cited article Renwick et al. (2013) is a review that utilises the AMO theory to explore green HRM practices. This highlights that organisations are better at developing green competencies and empowering staff to participate in environmental management than at understanding the motivational impact of these practices on employees. This knowledge gap emphasises the need for further research on the link between green HRM initiatives and employee motivation to engage in sustainability efforts. The findings of this study make several contributions to the green HRM literature. The second most-cited article by Dumont et al. (2017) introduced a six-item scale, widely adopted in quantitative research using structural equation modelling. This study empirically examines how green human resource management influences

employees' workplace green behaviour. By leveraging these scales for green HRM, psychological green climate, and individual green values, this study uncovered both direct and indirect impacts on employees' in-role and extra-role behaviours, contributing valuable insights to the field. The third most-cited article fervently urges hotel management and HR managers to create core organizational values that are focused on environmental management when they create their green HRM policies (Kim et al., 2019). It claims that green HRM methods greatly improve the environmental performance and eco-friendly behaviour of hotel staff. By fostering a green organizational culture, these practices lead to increased employee engagement in sustainable activities, ultimately improving a hotel's environmental outcomes. Tang et al. (2018) creates and verified a scale for assessing Green HRM practices, highlighting essential aspects of Green HRM. This study confirms the scale's reliability and validity through empirical analysis, providing a robust instrument for future research on sustainable

HR practices. When examining a specific area of research, highly cited papers are crucial because they have significantly impacted and garnered the attention of researchers in that field (Trinidad et al., 2021).

3.1.4 Which are the leading journals in the field of green HRM?

The journals that published highly cited and significant work on green HRM are listed in Table 3, which shows the highest number of publications (TP), total number of citations (TC), and the h-index for each journal. Combined, these findings indicate that the journal "Sustainability" has the most publications with 67 articles, followed by the "Journal of Cleaner Production" (38 publications). The "Journal of Cleaner Production" is the most influential journal in Green HRM with 2702 total citations, followed by the "International Journal of Human Resource Management" with 1871 citations, and "Journal of Business Ethics" with 1531 citations.

Table 3 Journals with maximum article publications.

S. No.	Publisher	Journal	TP	TC	H- index
1	MDPI	Sustainability	67	1416	20
2	Elsevier Sci Ltd	Journal Of Cleaner Production	44	3943	38
3	Emerald Group	International Journal of Manpower	30	792	17
4	Springer Heidelberg	Environmental Science and Pollution Research	26	253	8
5	John Wiley And Sons	Corporate Social Responsibility & Environmental Management	20	1156	12
6	John Wiley And Sons Ltd	Business Strategy and The Environment	17	1286	9
7	Emerald Group	Benchmarking-an International Journal	14	384	11
8	Routledge Journals, Taylor & Francis Ltd	International Journal of Human Resource Management	12	1871	9
9	Taylor and Francis Ltd	Cogent Business and Management	9	274	6
10	Elsevier Sci Ltd	International Journal of Hospitality Management	8	860	6

(Source: Authors calculations)

3.1.5 Who are the leading contributors to the field of Green Human Resource Management?

Table 4 highlights the top 10 influential authors in green HRM research ranked by the number of

publications and citations received. This analysis helps to identify the most prominent and active researchers in the field. Charbel Jose Chiapetta Jabbour is recognised for his significant contributions to Green HRM research, with a maximum number of publications and citations. His work offers a framework for implementing green HRM policies, focusing on the organizational, human, and environmental factors that influence the adoption of these practices. Jabbour emphasises the role of HRM in promoting environmental sustainability and fostering a green organizational culture, linking green HRM and green supply chain management (Jabbour et al., 2013; Jabbour & Renwick, 2018; Jose & Jabbour, 2011; Renwick et al., 2016). Douglas William Scott Renwick with 8 publications and 1441 citations is the second most cited author. This indicates that Renwick's work substantially impacted the development of Green HRM research.

Table 4 Most Influential Authors in terms of total Publications

Rank	Author	Country	TP	TC	H-index	PY-start
1	Charbel Jose Chiapetta Jabbour	Brazil	23	2118	21	2011
2	Mohd- Yusoff Yusliza	Malaysia	19	1187	11	2017
3	Qasim Ali Nisar	Pakistan	12	253	7	2021
4	Thurasamy Ramayah	Malaysia	11	875	9	2019
5	Shuang Ren	United Kingdom	9	458	5	2018
6	Jing Yi Yong	Malaysia	8	693	8	2016
7	Douglas William Scott Renwick	United Kingdom	8	1441	6	2011
8	Olawole Fawehinmi	Malaysia	8	502	6	2019
9	Guiyao Tang	China	8	770	5	2018
10	Richa Chaudhary	India	7	348	5	2018

(Source: Authors' own calculations)

3.2 What forms the forefront and intellectual basis of Green HRM research?

To understand the research landscape, we employed bibliographic coupling to gauge the shared references cited by two distinct articles. When two documents reference one or more common documents, they are considered bibliographically coupled. Additionally, we conducted co-citation analysis to identify the relationships between articles by examining which were cited by other pairs of articles. Figure 6 depicts the bibliographic coupling or frontiers of research on Green HRM. It is widely employed as a gauge of document similarity. The articles were divided into four clusters, indicated by red, blue, green, and yellow. Table 5 lists some important articles in a cluster-wise manner.

Cluster 1(Red): This cluster consists of articles which collectively explore Green HRM at the strategic, theoretical, and policy aspects of Green HRM. This includes research on how Green HRM integrates with corporate sustainability, supply chain management, leadership, and strategic HR practices. This cluster consists of highly cited foundational studies that develop frameworks and propose theoretical models for implementing Green HRM at the organizational level.

Cluster 2 (Green)- The articles of this cluster share a common focus on the implementation and impact of Green HRM. They explored how integrating environmental management into HR practices can promote sustainability within organisations. The findings suggest that Green HRM contributes to environmental sustainability, enhances

organizational reputation, fosters employee engagement, and improves overall performance. Additionally, it emphasises the employee-centric aspects of Green HRM, focusing on how HR practices influence individual behaviour, motivation, and the workplace sustainability culture. It highlights the role of green training, employee engagement, and psychological empowerment in fostering pro-environmental behaviours. The cluster underscores the link between GHRM and job satisfaction, organizational commitment, and green creativity.

Cluster 3 (Blue)- This cluster consist of articles from year 2016-2022. This cluster focuses on the impact of different green HRM practices on sustainability by showing their moderating and mediating effects.

Cluster 4 (Yellow)- This cluster consists of a single article (O'Donohue & Torugsa, 2016) by which investigates how 'green' HRM moderates the link between proactive environmental management and financial performance in small firms. This study explored how HR practices focused on sustainability can influence the relationship between environmental initiatives and financial outcomes, providing insights into the role of HRM in driving organizational success.

Table 5: Most significant articles cluster wise.

S. No.	Cluster	Article	Methodology	Sector	Theory	Country
1	Red	Renwick et al. (2013)	Review	-	Ability motivation opportunity	-
2		(Jabbour et al., 2013)	Case study		-	Brazil
3		(Jabbour & De Sousa Jabbour, 2016)	Review	-	-	-
4		(Kim et al., 2019)	PLS- SEM	Hospitality	Social identity theory	Thailand
5		(Zaid et al., 2018)	PLS- SEM	Manufacturing	Resource Based View	Palestine
6		(Tang et al., 2018)	EFA and CFA	Mixed		China
1	Green	(Dumont et al., 2017)	SEM	Manufacturing	Supply value fit	China
2		(Pham et al., 2019)	Mixed method	Hospitality	Ability motivation opportunity	Vietnam
3		(Hameed et al., 2020)	SEM	Manufacturing	Ability motivation opportunity and Supply value fit	Pakistan
4		Ahma et al. (2021)	PLS SEM	Banking, Education and NGOs	Social identity theory	Pakistan
5		(Chaudhary, 2020)	Regression analysis	Automobile	Social identity theory	India
6		(Pinzone et al., 2019)	Regression	Healthcare	Goal setting theory	Italy
1	Blue	Sing et al. (2020)	SEM	Manufacturing	Resource-based view and Ability motivation opportunity	United Arab Emirates

| 2		(Yong et al., 2019)	SEM	Manufact uring	Intellectual Capital-based view theory	Mala ysia
3		(Haldorai et al., 2022)	PLS SEM	Hospitalit y	Resource based view	Philip pines
4		(Rehman et al., 2021)	PLS SEM	Manufact uring	Natural-resource-based theory suggests	Mala ysia
1	Yellow	(O'Donohue & Torugsa, 2016)	SEM	Manufact uring	absorptive capacity theory and Resource based view	Austr alia

(Source: Authors' own creation)
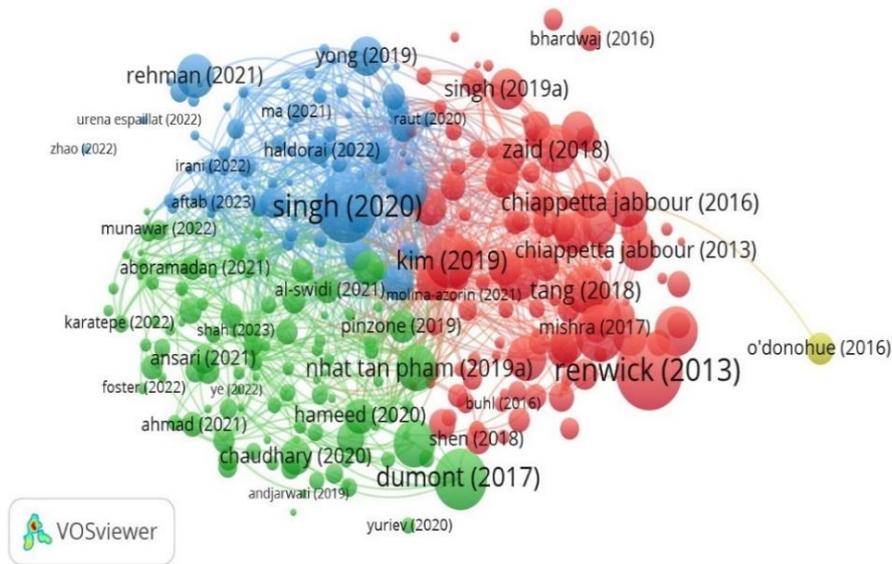
Figure 6 Bibliographic coupling
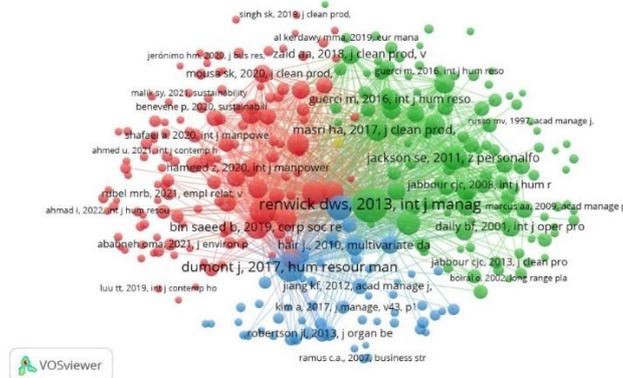
(Source: Authors' own creation)

Figure 7 Co-citation analysis

(Source: Authors' own creation)

Figure 7 illustrates the co- citation network. Co-citation analysis identifies connections between topics and authors by examining references that are frequently cited in articles. Using data from databases and graphical techniques, it reveals research clusters unified by shared themes, highlighting the relationships between work and contributors (Danvila-del-Valle et al., 2019).

Cluster 1 (Green)- This cluster includes 134 items and is identified as the most polluted. The articles spanned from 2001 to 2013, showcasing the transition from strategic to green HRM. These publications have contributed significantly to the evolution of the field by focusing on the conceptualisation of Green HRM. Notable articles in this cluster are those by (Guerci et al., 2016).

Cluster 2 (Red)- Comprising 112 articles from 2013 to 2021, this cluster is grounded in foundational concepts of green HRM introduced by (Renwick et al., 2013). Other significant contributions by (Jabbour et al., 2013); (Mishra 2017); (Nejati et al. 2017) provide empirical evidence on green HRM practices. These studies explore how green HRM initiatives can enhance sustainability, employee engagement, and organizational performance. Collectively, they highlight the critical role of HRM in fostering environmentally friendly practices within organisations, emphasising the need to integrate sustainability into HR strategies.

Cluster 3 (Blue)- This cluster contains 57 items dated between 2010 and 2017. Authors (Kim et al., 2019; Norton et al., 2014) discuss the broader impact of Green HRM on organizational performance, suggesting that sustainable HR practices can improve efficiency and effectiveness, benefiting both organizations and the environment. A study by (Dumont et al., 2017; Norton et al., 2014; Park & Kim, 2016) connect through their examination of Green HRM practices, exploring how these strategies enhance environmental performance, promote eco-friendly employee behaviours, and integrate environmental sustainability into HR policies.

4.3 How is the Green HRM research conceptually structured?

Figure 8 highlights the core concepts of Green HRM, with "Performance" being the most frequently used keyword. This underlines the significance of achieving organizational, employee, and societal benefits through green policies and practices. Keywords like "Sustainability" and "Behaviour" also play crucial roles, emphasising the goals of sustainability and the impact of employee behaviour on the success of Green HRM initiatives. The figure further illustrates how Green HRM is interconnected with broader organizational practices, such as "Organisational Citizenship Behaviour," "Corporate Social Responsibility," and "Supply Chain Management."

Figure 9 shows the relationships between the keywords in Green HRM research, identifying five distinct clusters. These clusters reveal a focus on various aspects of Green HRM, such as sustainable performance in the hotel industry, enhancing environmental performance through green training and practices, and the contributions of Green HRM to sustainability and corporate social responsibility. The analysis also highlights the role of AMO theory and the importance of China in Green HRM research, as well as the impact of green innovation and transformational leadership on competitive advantage in SMEs. Overall, the figures emphasise the multidimensional nature of Green HRM and its broad implications for organizational practices and performance.

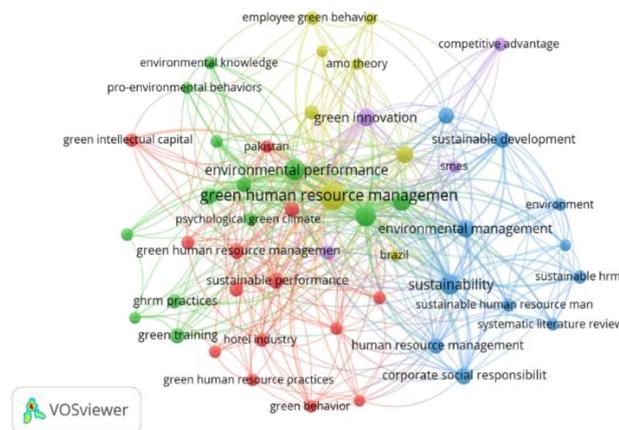*Figure 8 Word cloud of frequently used keywords*

(Source: Authors' own creation)

Figure 9 Word co-occurrence map of most used keywords

(Source: Authors' own creation)

4. Findings

The results of this investigation show that in recent years, scholars have become increasingly interested in the relatively new field of Green HRM. We can see a gradual increase in the articles; in year 2023 maximum number of articles were published. Top-cited article by (Renwick et al., 2013) is a review article which by using AMO theory focuses on the how Green HRM practises affect employees' motivation to engage in environmental activities, the findings of this study make several contributions to the green HRM literature. The second most cited article by (Dumont et al., 2017) developed a 6 item scale which has been repeatedly used in quantitative research, especially in structural equation modelling. Sustainability is the most publishing journal in this field, with 67 publications and citations of 3943. Jabbour is the most productive author, with 23 publications published every year from 2011 to 2023, except 2021. China is the most productive country with 312 publications.

5. Limitations

Our study had certain limitations. The major limitations of this study are as follows. First, if the search terms were not used by the authors of the articles in titles, abstracts, or keywords, the sample may have missed some relevant publications. Second, if the articles were not used by Web of

Science in their collection, we might have missed them. Third, the primary drawback of all literature reviews is that they only reflect the state of the field at the time they are written, but citation scores are constantly changing, and the search strings keep updating so that the results with the same search string for the same time period might show different results. Fourth, we included articles from only one database, the Web of Science.

6. Future Research agenda:

This bibliometric study focuses on Green HRM research and provides comprehensive details on the published literature and the field's overall research perspective. Based on the data gathered from WoS, we propose the use of bibliometric approaches to visualise and analyse the structure and evolution of Green HRM research from 2010 to 2024. To determine the impact of authors, institutions, countries, and journals, as well as the connections between them, we performed a performance study using quantitative methodologies and co-citation analysis. With the aim of creating a set of rules that organisations and nations can adhere to, Green HRM practices and policies should be addressed internationally on a single platform (Soomro et al., 2021). It has been found that placing environmental issues at the strategic level can allow smooth implementation (Mishra, 2017), and the practices of green HRM and its implementation have been well researched (Amrutha & Geetha, 2020; Gupta, 2018; Masri & Jaaron, 2017; Nejati et al., 2017; Ren et al., 2018). However, there is still a lack of comprehensive understanding of how companies integrate their green HRM strategies with their business strategies which requires qualitative studies. Research has also shown that the field is in the rising phase as the shift from Strategic HRM to Green HRM can be witnessed by witnessing an increase in quantitative studies, despite the demand for in-depth understanding through more qualitative studies (Bahuguna et al., 2022). Based on our bibliometric review, we suggest the following areas of investigation for further research.

1. Organisations have shifted from traditional HRM to Sustainable HRM in response to intense pressure from stakeholders to reduce environmental harm. However, the process of formulating Green HRM strategy that aligns with the business objectives remains unclear. Therefore, there is a need for more qualitative research, as strategic integration ensures that green practices align with the company's core objectives rather than existing as standalone initiatives (Singh & El-Kassar, 2019; Zihan & Makhbul, 2024).

2. Green practices cannot be implemented without top management cooperation (Haldorai et al., 2022; Huo et al., 2020; Yusliza et al., 2019). However, there is a significant gap in the literature regarding the implementation of green HRM strategies at various organizational levels and the roles that individuals such as managers and employees play in this process. Addressing this gap can be the focus of future research, providing valuable insights into how green HRM can be successfully integrated across different levels within an organisation.

3. The HRM department plays a crucial role in the development and execution of HRM strategies. However, the specific expertise and skills HR professionals need to formulate and implement Green HRM strategies effectively remain unclear. Future research should explore the competencies required by HR professionals to successfully drive and integrate green practices within organisations, ensuring that these strategies align with broader sustainability goals.

4. While Green HRM policies and practices are widely documented in the literature, there is a need for further research to determine whether the reported practices align with the actual implementation. This can be achieved by examining the monitoring tools used by organisations during performance measurements. Furthermore, it is essential to standardise a set of core green practices to ensure consistency and effectiveness in promoting sustainability across different industries.

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