

# Trend of the Research on Green Human Resources Management and Environmental Sustainability: A Bibliometric Analysis

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**Abstract.** Global consciousness on environmental concerns is on the rise. There is a growing recognition among individuals, organizations, and governments of the significance of incorporating sustainable and eco-friendly practices into everyday activities, including the management of human resources. The objective of this research is to encourage firms to increasingly prioritize sustainable practices in employee career development. They provide development and training opportunities that specifically target knowledge and skills related to sustainable practices. Furthermore, corporations may perceive promotions or employment opportunities pertaining to sustainable practices as a means of recognition and professional growth. Bibliometric analysis employs technologies such as Fox Viewer and posting on Perish. The research findings indicate that implementing environmentally conscious personnel management practices contributes to the creation of a conceptual framework that integrates environmental and sustainability factors into personnel management. This model facilitates comprehension of the correlation between HRM practices and sustainable objectives, directs the formulation of more sustainable strategies and policies, and generates pragmatic suggestions for organizations to implement sustainable HRM practices. The primary constraint is the restricted or fragmented accessibility of data. Obtaining pertinent data for studies on green human resource management may pose challenges due to its limited availability or lack of openness. In addition, there is also the potential for bias in the existing data, such as data that only encompasses a portion of the population or specific organizations. When doing research on environmentally friendly human resource management, it is important to take into account the various organizational contexts, such as variances in size, industry sector, organizational culture, and other characteristics. This can impede the ability to formulate sweeping generalizations or derive overarching conclusions that can be universally applied across many circumstances.

**Keywords:** Green Human Resources, GHRM, Human Resources, Sustainability, Bibliometric analysis

## 1 Introduction

Global consciousness on environmental concerns is on the rise. There is a growing recognition among individuals, businesses, and governments of the significance of incorporating sustainable and eco-friendly practices into daily activities, including the

management of human resources (Arulrajah et al., 2016) Global companies are increasingly using sustainable methods in their human resource management, specifically targeting the reduction of carbon emissions and improvement of energy efficiency (Moreno et al., 2006). They enact rules and protocols to diminish energy consumption, embrace more energy-efficient technologies, and motivate staff to engage in eco-friendly energy endeavors (Dong et al., 2022). The objective is to minimize the ecological footprint and optimize operational expenses.

Green human resources management strategies encompass waste management and recycling inside the workplace (Arulrajah et al., 2016). Numerous companies implement policies and initiatives to promote waste segregation, waste reduction, and the reuse or recycling of resources. This entails instructing personnel on appropriate trash disposal practices and furnishing them with the necessary facilities. Subsequently, organizations began offering awards and recognition to employees who made substantial contributions to sustainable practices (Chenhall & Langfield-Smith, 2003). This may encompass exceptional accolades, official diplomas, or public acknowledgment of their accomplishments and endeavors in formulating and executing sustainable projects within the professional setting. The acknowledgment serves as a catalyst for staff to persist in engaging in sustainable practices.

Organizations in Indonesia are becoming more cognizant of the need of implementing Green human resources management practices. Increasingly, organizations are recognizing that embracing sustainable practices can yield enduring advantages, encompassing both ecological and socio-economic dimensions. Certain firms have implemented sustainable measures in their human resource management, including the implementation of regulations that eliminate the use of plastic, the adoption of efficient energy management techniques, and the implementation of programs to raise environmental awareness among employees (Meng et al., 2023). The implementation of environmentally-friendly human resources management strategies also has an impact on the recruitment process in Indonesia. An increasing number of companies are incorporating sustainable factors into their personnel selection and recruitment processes. The organization is seeking individuals who possess a comprehension and dedication to environmental matters, and have the capability to contribute to the company's sustainable endeavors. Furthermore, there is a growing need for proficient workers in the areas of renewable energy, waste management, and other environmentally friendly activities, which is also reflected in the recruiting patterns (Twidell, 2021).

The implementation of sustainable certification and standards in Indonesia further reinforces the adoption of environmentally-friendly human resources management methods. Various organizations and institutions have established certifications and standards that regulate sustainable practices in the field of human resource management (Nawangari & Sutawijaya, 2019). Green Office certification acknowledges firms who use sustainable practices in their workplace as a means of recognition. It incentivizes organizations to enhance their sustainable performance and fulfill specific criteria.

A significant challenge in Green human resources management is the inherent complexity in quantifying the effects of adopted sustainable practices. Implementing sustainable performance measurement practices, such as the reduction of carbon emissions (Lee & Cho, 2021), energy efficiency (Wang et al., 2022), Waste management processes can be intricate and necessitate a meticulous approach. The absence of uniform criteria and measurements further complicates the task of comparing and documenting continuous performance. Implementing Green human resources management necessitates adequate allocation of resources, encompassing personnel, budget, and infrastructure. Inadequate resources can

impede the adoption of sustainable methods (Fang et al., 2022). Occasionally, organizations may lack sufficient financial resources or personnel to efficiently carry out sustainable programs.

Implementing Green human resources management typically necessitates significant alterations in business culture and behavior (Jordão et al., 2014). The reluctance to embrace change, particularly among management or staff with more traditional mindsets, might impede the adoption of sustainable practices (Song et al., 2023). To overcome resistance and foster a culture that promotes sustainable activities, it is imperative to enhance awareness, education, and communication. Green human resources management can also face obstacles in the form of legal and regulatory problems. The absence of clear guidelines or supportive regulations about sustainable practices in the workplace can hinder the implementation of Green human resources management techniques. Furthermore, variations in rules across different countries or areas might provide challenges in achieving consistent implementation of sustainable practices. (Wiener, 1999)

Organizations are progressively incorporating sustainable practices into employee career development as a primary objective of this research. They offer development and training opportunities that specifically target knowledge and skills related to sustainable practices. Furthermore, firms can contemplate promotions or job possibilities that are associated with sustainable practices as a means of rewarding employees and fostering their professional growth. The author formulated numerous research inquiries in the study as outlined above:

- a. Which publications have the greatest impact in the field of green human resources management?
- b. How to assess the cognitive framework inside the referenced papers by citation analysis?
- c. What are the past, present, and future research trends pertaining to green human resources management?

## **2 Literature Review**

Green Human Resources Management is a human resources management method that emphasizes sustainable practices and environmental responsibility in the workplace (Nawang-sari & Sutawijaya, 2019). The environmental movement gained momentum during the 1960s and 1970s, emphasizing the significance of environmental preservation and mitigating the adverse effects of human actions (Sullivan, 2012). Currently, corporations are becoming aware of the necessity to take environmental considerations into account while making business decisions.

Society's understanding of environmental issues had a notable boost during the 1980s and 1990s. The occurrence of environmental catastrophes like the Exxon Valdez oil spill in 1989 and the Amazon forest fires in the 1990s further emphasized the importance of taking measures to save the environment (Wang & Zhi, 2016). During the 1990s, organizations commenced implementing sustainable principles in their operations. This encompasses waste minimization, optimization of energy use, utilization of eco-friendly materials, and consideration of the entire product life cycle. These techniques are beginning to have an impact on the field of human resource management (Mithila, 2019).

During the 2000s, there was an increased focus on the correlation between sustainable practices and human resource management. Organizations are increasingly recognizing that

human resources play a crucial role in implementing sustainable practices and fostering a sustainable business culture (Fang et al., 2022). During the 2010s, the notion of Green human resources management emerged as a distinct and well-organized approach. Green human resources management entails incorporating sustainable practices into multiple facets of human resources management, such as recruitment, training and development, performance assessment, remuneration, and business policy (Wołodźko & Woźniak, 2017). Global organizations are progressively acknowledging the necessity of using sustainable practices in human resource management to mitigate adverse effects on the environment and establish enduring value (Sullivan, 2012)

## **2.1 Bibliometric Analysis**

Bibliometric analysis is a quantitative methodology employed to examine literature or scientific publications through the application of statistical and mathematical techniques. Bibliometric analysis aims to quantitatively measure, evaluate, and comprehend the trends, patterns, and characteristics of scientific publications within a specific research subject. This approach entails the gathering and examination of bibliographic data, encompassing article titles, authors, abstracts, keywords, publication journals, and other pertinent information pertaining to scientific publications (Rons, 2018). Subsequently, this data undergoes processing and analysis employing bibliometric methodologies, including frequency analysis, co-citation analysis, correlation analysis, network analysis, and so forth.

Bibliometric analysis offers valuable insights into the progression and dynamics of research within a specific subject. It enables the identification of new research trends, the determination of significant authors or institutions, and the comprehension of collaboration patterns among researchers or institutions. This approach can also be employed to assess the caliber of scientific papers, pinpoint research areas of high interest, and create visual representations of research landscapes. Bibliometric analysis is a valuable tool for quantifying the influence and importance of scientific publications. It also provides crucial insights for making informed decisions in research, policy-making, and scientific information management (Aytaç & Khayet, 2023)

## **3 Methods**

### **3.1 Search Strategy**

The database search technique is derived from the Scopus core collection as of July 7, 2023. The search string is meticulously executed utilizing themes in the Scopus database, enabling the extraction of published data based on title, abstract, and keywords (Rons, 2018). Scopus is utilized for its reputation as the foremost and most superior database, owing to its extensive data coverage across diverse scientific areas. There are no specific limitations on time spans, scientific disciplines, document and data sources when it comes to the topic of green human resources management. This is due to the limited research conducted on this subject. The scope of green human resources management primarily encompasses green recruitment and selection, green job analysis and design, green training and development, green performance management, and green reward management. (Fahimnia et al., 2015). The

research focused on the issue of "Green Human Resources" or "Human Resources" or "Green human resources management". A total of 628 articles were located in various periodicals.

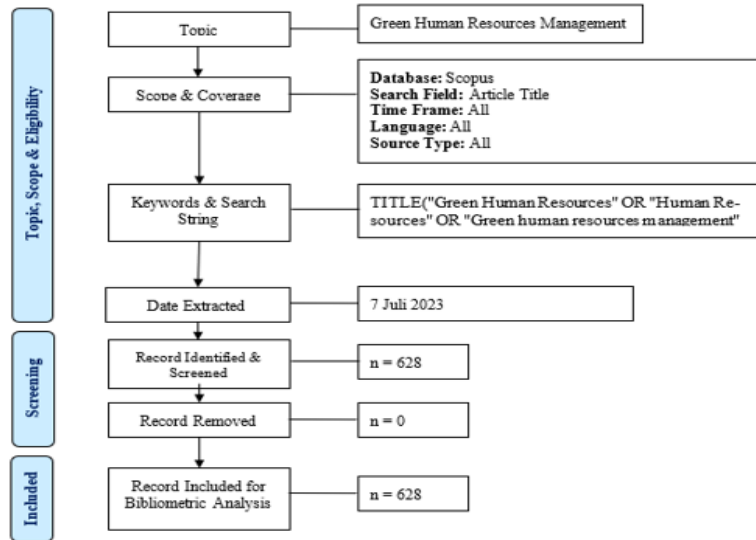


Figure 1. Flowchart of the Plan for the Search

### 3.2 Data Analysis

#### 3.2.1 Tools

Procedure The research tool employed is the database, which involves setting the objectives, designating the scope, conducting a search on Scopus, refining the results using refine export, exporting the final results, and performing analysis using Vosviewer. Adhere to the principle of "publish or perish." (van Eck & Waltman, 2010) Generating a map of bibliographic data and conducting co-occurrence analysis and co-citation analysis. Bibliometric analysis involves incorporating data from Scopus and doing an analysis to generate maps and identify research trends.

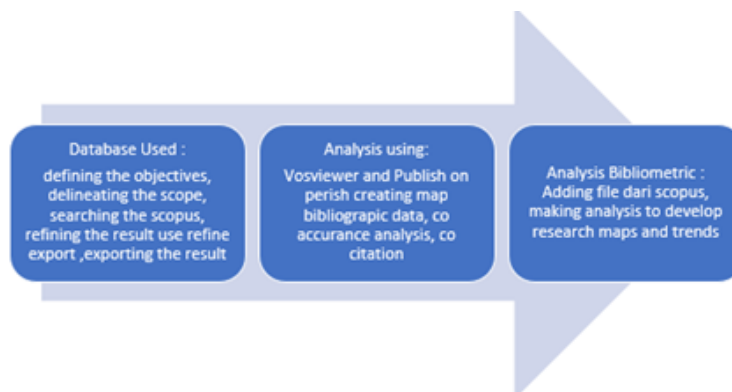


Figure 2. Data Analysis

## 4 Results

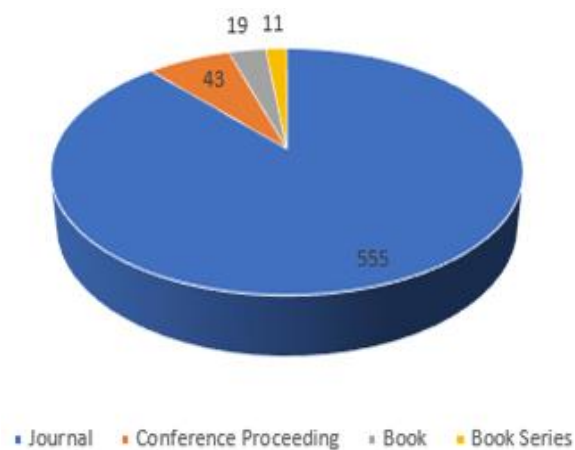
### 4.1 Documents Profiles

A document profile serves the primary function of offering a comprehensive understanding of the volume, excellence, and influence of a certain scientific publication or document. Researchers can employ bibliometric approaches to quantify and examine publishing attributes, including publication count, collaboration patterns, geographical dispersion, citations, and academic influence. Based on the data presented in table 1, it can be inferred that approximately 83.12% or 522 publications are focused on the subject of green human resources management. These publications are primarily in the form of articles, followed by conference papers (7.01%), reviews (3.98%), book chapters (3.18%), books (0.80%), conference reviews (0.64%), errata (0.32%), letters (0.32%), notes (0.32%), editorials (0.16%), and retracted articles (0.16%).

**Table 1.** Type Document

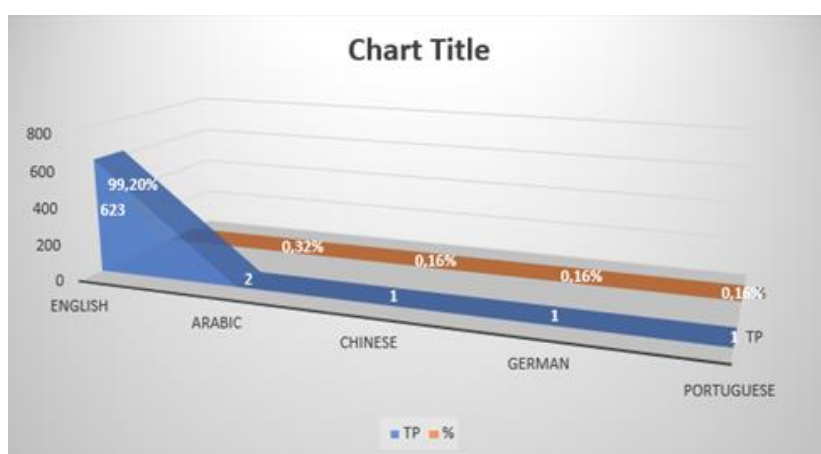
Document Type	Total Publications	Percentage
Article	522	83.12%
Conference Paper	44	7.01%
Review	25	3.98%
Book Chapter	20	3.18%
Book	5	0.80%
Conference Review	4	0.64%
Erratum	2	0.32%
Letter	2	0.32%
Note	2	0.32%
Editorial	1	0.16%
Retracted	1	0.16%

Another document profile pertaining to green human resources management involves examining and quantifying data sources acquired from the Scopus database. Figure 3 illustrates that the predominant data sources are journals, accounting for 555 publications (88.68%), followed by conference proceedings with 43 publications (6.85%).



**Figure 3.** Data Analysis

The language distribution of publications connected to green human resources management is as follows: English accounts for around 99.20% or 623 out of the total number of documents published, while Arabic, Chinese, German, and Portuguese each represent 0.32%, 0.16%, 0.16%, and 0.16% respectively.



**Figure 4.** Languages

The document profile is determined based on the language, data source, and document type. The next stage involves examining the subject area, specifically focusing on the scope of knowledge related to green human resources management. Table 2 shows that the subject area with the most extensive coverage is Business, Management, and Accounting, which includes a total of 407 publications or 64.81%. This is because GHRM is a part of the disciplines of business, management, and accounting. The percentages for each field of study are as follows: Environmental Science (34.08%), Social Sciences (31.21%), Energy (19.59%), Engineering (18.15%), Computer Science (12.10%), Decision Sciences (10.9%), Economics, Econometrics and Finance (10.51%), Psychology (4.62%), and Medicine (2.55%).

**Table 2.** Subject Area

Subject Area	TP	%
Business, Management and Accounting	407	64.81%
Environmental Science	214	34.08%
Social Sciences	196	31.21%
Energy	123	19.59%
Engineering	114	18.15%
Computer Science	76	12.10%
Decision Sciences	69	10.99%
Economics, Econometrics and Finance	66	10.51%
Psychology	29	4.62%
Medicine	16	2.55%

## 4.2 Publication Trends

Examining publication trends enables academics to discern study subjects that are garnering substantial focus within a certain field. Through the examination of publication titles, keywords, or subjects within a specific timeframe, followed by the analysis of publication patterns throughout time, researchers can gain insights on the growth and progression of the study domain. Publication trends can provide insights into the influence of research by analyzing the frequency of citations from other scholars. This information is valuable for assessing the contributions made in research

**Table 3.** Year of Publication

Row Labels	TP	%	NCP	TC	C/P	C/CP	h-index	g-index
2014	120	12.15%	95	2654	22.12	27.94	26	49
2015	117	11.84%	94	2432	20.79	25.87	26	47
2016	111	11.23%	90	1537	13.85	17.08	19	36
2017	136	13.77%	98	2049	15.07	20.91	23	42
2018	117	11.84%	102	1618	13.83	15.86	25	34
2019	98	9.92%	76	901	9.19	11.86	17	24
2020	87	8.81%	70	788	9.06	11.26	16	24
2021	90	9.11%	56	436	4.84	7.79	11	17
2022	106	10.73%	51	137	1.29	2.69	5	7
2023	6	0.61%	2	9	1.50	4.50	2	3
<b>Grand Total</b>	<b>988</b>	<b>100.00%</b>	<b>734</b>	<b>12561</b>	<b>12.71</b>	<b>17.11</b>	<b>170</b>	<b>283</b>

The publication trend based on the year of publication may be observed in table 3. Over the past decade, the subject of green human resources management has experienced significant fluctuations in the published literature. In 2017, there were 136 publications on green human resources management, accounting for 13.77% of the total. These publications received a total of 2049 citations. However, despite the higher number of publications in 2017 compared to 2014 and 2015 (120 and 117 respectively), the number of citations in those years exceeded that of 2017, with 2654 and 2432 citations respectively.

## 4.3 Publications by Institutions

The emerging publication trend is the examination of "Publications by Institutions," which aims to compare research productivity across various academic organizations. This analysis aids in evaluating the research activity and scientific contribution of each institution by quantifying the number of publications they produce. Additionally, examining publications by institution can reveal patterns of collaboration and networking among these institutions. This research facilitates the mapping of contacts and ties between institutions by examining the collaboration of authors and institutions in publications.



**Table 4.** Most Productive Institutions With Minimum of Five Publications

<b>Institution</b>	<b>TP</b>	<b>%</b>
Universiti Sains Malaysia	20	3.18%
Universiti Malaysia Terengganu	20	3.18%
Universidade Estadual Paulista Júlio de Mesquita Filho	16	2.55%
Montpellier Business School	16	2.55%
Universiti Putra Malaysia	13	2.07%
The Superior University, Lahore	13	2.07%
Universidade de São Paulo	12	1.91%
Univerzita Tomáše Bati ve Zlině	12	1.91%
Xi'an Jiaotong University	10	1.59%
Shandong University	10	1.59%
Taylor's University Malaysia	10	1.59%
Nottingham Trent University	9	1.43%
Universiti Teknologi Malaysia	9	1.43%
Swinburne University of Technology	9	1.43%
Sukkur IBA University	9	1.43%

#### 4.4 Publications by Countries

This analysis entails gathering and examining publication data from authors associated with particular countries. This allows for an assessment of the productivity, quality, and impact of research from each country by determining the number of publications from authors affiliated with that country. Specifically, this approach aids in assessing the extent of research activities within the nation. This data can be utilized to compare and chart the research contributions of various nations, as well as ascertain the degree of scientific advancement in each country.

**Table 5.** Top 10 Countries Contributed to the Publications

<b>Country</b>	<b>TP</b>	<b>%</b>
China	129	20.54%
Pakistan	103	16.40%
Malaysia	101	16.08%
India	74	11.78%
United Kingdom	57	9.08%
Australia	49	7.80%
France	39	6.21%
Saudi Arabia	33	5.25%
United States	31	4.94%
Indonesia	30	4.78%

An analysis of the geographic distribution of publication regions can be conducted by examining the author's affiliation or the location where the publication was produced. The identification of geographic regions in this analysis is based on the country, region, or institution of the author or publisher. This data can be utilized to examine the spatial distribution of publications about green human resources management. According to Figure 5, China has the highest number of publications, with a total of 129. The Chinese government has implemented substantial measures to advance sustainable development and safeguard the environment. China has implemented a range of environmentally friendly policies and programs, including those related to human resources. This encompasses initiatives aimed at enhancing sustainability in human resource procedures, such as sustainable recruiting and selection, environmental training, and skills enhancement.



**Figure 5.** Worldwide Scientific Production Indexed by Scopus

#### 4.5 Publications by Source Titles

The "Publications by Source Titles" study enables the assessment of the caliber of a specific journal or publication source by considering the quantity of publications it has produced. This approach assists in selecting journals or publication sources that possess exceptional quality and substantial influence in a specific research topic by considering characteristics such as journal impact factor, citations, and academic repute. This approach also aids in comprehending the effect and sway of journals or publication sources in specific research domains. The "Publications by Source Titles" study assists in assessing the degree to which articles from a specific journal contribute to scientific progress and research in the relevant field by considering journal impact factors, citations, and academic influence.

**Table 6.** Most Active Source Titles

Row Labels	TP	NCP	TC	C/P
International Journal of Productivity and Performance Management	115	107	3518	30.59
International Journal of Operations and Production Management	75	73	10248	136.64
Measuring Business Excellence	62	57	1634	26.35
International Journal of Business Performance Management	47	44	828	17.62
Production Planning and Control	39	35	1473	37.77
International Journal of Production Research	39	38	2366	60.67
Management Accounting Research	35	34	3566	101.89
Public Money and Management	35	35	835	23.86
International Journal of Production Economics	35	35	4544	129.83
Total Quality Management and Business Excellence	24	22	411	17.13
Benchmarking	23	22	1828	79.48

The upcoming trend in publishing involves focusing on source titles, namely on journals that hold significant influence in the field of green human resources management. Table 6 displays the publication statistics for various journals. The International Journal of Productivity and Performance Management stands out with the highest number of publications, totaling 115. Additionally, it has received a significant number of citations, amounting to 3518. Following closely behind is the International Journal of Operations and Production Management with 75 publications. Other notable journals include Measuring Business Excellence (62), International Journal of Business Performance Management (47), Production Planning and Control (39), International Journal of Production Research (39), Management Accounting Research (35), Public Money and Management (35), International Journal of Production Economics (35), Total Quality Management and Business Excellence (24), and Benchmarking (23).

#### 4.6 Citation Metrics

Citation metrics quantify the impact of a scientific publication on the body of current research and literature. The frequency of citations received by a publication serves as an objective measure to assess how frequently other researchers refer to the work, enabling a direct comparison between various publications. By examining the citation count, one may assess the level of scientific impact that these papers have made. Table 7 indicates that there were a total of 628 published papers, which received a total of 19,170 citations during a span of 15 years. This data suggests that research on green human resources management is still very limited.

**Table 7.** Citations Metrics

Metric	Data
Papers	628
Citations	19170
Years	15
Cites_Year	1278
Cites_Paper	30.53
Cites_Author	7265.1
Papers_Author	241.96
Authors_Paper	3.3
h_index	71
g_index	126
hc_index	83
hI_index	20.66

#### 4.7 Highly Cited Documents

Highly Cited Documents are employed to discern publications that have exerted a substantial influence in a specific field of research. These documents typically receive extensive citations from other academics, suggesting that the work significantly contributes to the advancement of knowledge and understanding in the relevant field. Table 8 presents the article by D.W. Renwick, T. Redman, S. Maguire (2013) titled "Green Human Resource Management: A Review and Research Agenda" with the highest total citations of 843. It also includes the article by S.K. Singh, M.D. Giudice, R. Chierici, D. Graziano (2020) titled "Green innovation and environmental performance: The role of green transformational leadership and green human resource management" with 587 citations, and the article by J. Dumont, J. Shen, X. Deng (2017) titled "Effects of Green human resources management Practices on Employee Workplace". The study titled "Green Behavior: The Role of Psychological Green Climate and Employee Green Values" by P. Paillé, Y. Chen, O. Boiral, and J. Jin (2014) explores the relationship between psychological green climate, employee green values, and their impact on environmental performance. This study is related to another study titled "The Impact of Human Resource Management on Environmental Performance: An Employee-Level Study" by the same authors (2014).

**Table 8.** 20 Most Cited Articles

No.	Author(s)	Title	TC	C/Y
1	D.W. Renwick, T. Redman, S. Maguire (2013)	Green Human Resource Management: A Review and Research Agenda*	843	84.3
2	S.K. Singh, M.D. Giudice, R. Chierici, D. Graziano (2020)	Green innovation and environmental performance: The role of green transformational leadership and green human resource management	587	195.67
3	J. Dumont, J. Shen, X. Deng (2017)	Effects of Green human resources management Practices on Employee Workplace Green Behavior: The Role of Psychological Green Climate and Employee Green Values	473	78.83
4	P. Paillé, Y. Chen, O. Boiral, J. Jin (2014)	The Impact of Human Resource Management on Environmental Performance: An Employee-Level Study	462	51.33

No.	Author(s)	Title	TC	C/Y
5	Y.J. Kim, W.G. Kim, H.-M. Choi, K. Phetvaroon (2019)	The effect of green human resource management on hotel employees' eco-friendly behavior and environmental performance	426	106.5
6	C.J.C. Jabbour, A.B.L. De Sousa Jabbour (2016)	Green Human Resource Management and Green Supply Chain Management: Linking two emerging agendas	394	56.29
7	S.E. Jackson, D.W.S. Renwick, C.J.C. Jabbour, M. Muller-Camen (2011)	State-of-the-Art and Future Directions for Green Human Resource Management: Introduction to the special issue	373	31.08
8	G. Tang, Y. Chen, Y. Jiang, P. Paillé, J. Jia (2018)	Green human resource management practices: scale development and validity	322	64.4
9	A.A. Zaid, A.A.M. Jaaron, A. Talib Bon (2018)	The impact of green human resource management and green supply chain management practices on sustainable performance: An empirical study	310	62
10	N.T. Pham, Z. Tučková, C.J. Chiappetta Jabbour (2019)	Greening the hospitality industry: How do green human resource management practices influence organizational citizenship behavior in hotels? A mixed-methods study	294	73.5
11	S. Roscoe, N. Subramanian, C.J.C. Jabbour, T. Chong (2019)	Green human resource management and the enablers of green organisational culture: Enhancing a firm's environmental performance for sustainable development	287	71.75
12	B.B. Saeed, B. Afsar, S. Hafeez, I. Khan, M. Tahir, M.A. Afridi (2019)	Promoting employee's proenvironmental behavior through green human resource management practices	283	70.75
13	S. Ren, G. Tang, S. E. Jackson (2018)	Green human resource management research in emergence: A review and future directions	267	53.4
14	H.A. Masri, A.A.M. Jaaron (2017)	Assessing green human resources management practices in Palestinian manufacturing context: An empirical study	252	42
15	C.J.C. Jabbour (2013)	Environmental training in organisations: From a literature review to a framework for future research	244	24.4
16	S. Ahmad (2015)	Green Human Resource Management: Policies and practices	229	28.63
17	S.K. Singh, A.-N. El-Kassar (2019)	Role of big data analytics in developing sustainable capabilities	218	54.5
18	M. Guerri, A. Longoni, D. Luzzini (2016)	Translating stakeholder pressures into environmental performance – the mediating role of Green human resources management practices	217	31
19	A.A. Teixeira, C.J.C. Jabbour, A.B.L. De Sousa Jabbour, H. Latan, J.H.C. De Oliveira (2016)	Green training and green supply chain management: Evidence from Brazilian firms	210	30
20	C.J.C. Jabbour, D. Juggend, A.B.L. De Sousa Jabbour, A. Gunasekaran, H. Latan (2015)	Green product development and performance of Brazilian firms: Measuring the role of human and technical aspects	205	25.63

## 4.8 Top Keywords

By conducting a comprehensive keyword analysis, one can identify the most commonly utilized keywords in scientific publications within a specific research domain. This aids in discerning research patterns and presently prevalent subjects, serving as a compass in the quest for knowledge in scientific databases or other sources. Researchers can obtain valuable information on relevant and effective keywords for literature searches by identifying the most commonly used keywords in related publications.

Table 9 displays the distribution of publications based on the most frequently used keywords. The highest keyword, "Green Human Resource Management," accounts for 40.92% of the total publications. Other significant keywords include "Human Resource" (16.72%), "Sustainability" (16.72%), and "Environmental Management" (16.72%). Additionally, the keywords "Human Resource Management," "Environmental Performance," "Resource Management," "Sustainable Development," and "Resource Allocation" are also present.

**Table 9.** Top Author's Keywords

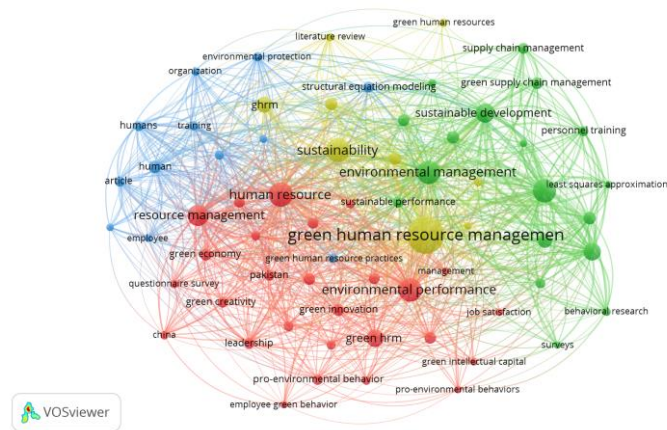
Keywords	TP	%
Green Human Resource Management	257	40.92%
Human Resource	105	16.72%
Sustainability	105	16.72%
Environmental Management	103	16.40%
Human Resource Management	101	16.08%
Environmental Performance	98	15.61%
Resource Management	78	12.42%
Sustainable Development	70	11.15%
Resource Allocation	56	8.92%
Green human resources management	55	8.76%
GHRM	47	7.48%
Human Resources Management	36	5.73%
Corporate Social Responsibility	31	4.94%
Environmental Sustainability	31	4.94%
Natural Resources Management	31	4.94%
Human	29	4.62%
Green Human Resources Management	28	4.46%
Green Human Resource Management (GHRM)	26	4.14%
Green Innovation	26	4.14%
Green Supply Chain Management	26	4.14%
Green Training	26	4.14%
Green Economy	25	3.98%

### 4.8.1 Co-Occurrence Analysis of Terms Based on Title

Co-occurrence networks are employed to depict the correlation between keywords or concepts that frequently occur together in scientific publications. Each keyword is regarded as a node in the network, and the presence of lines or connections between nodes signifies that the

keywords frequently co-occur in the same publication. Figure 5 displays 4 clusters, each represented by a different hue. There are a total of 1974 keywords. By setting a minimum keyword accuracy of 5, the clusters are formed, resulting in a new minimum keyword accuracy of 11. This new threshold yields 66 keywords.

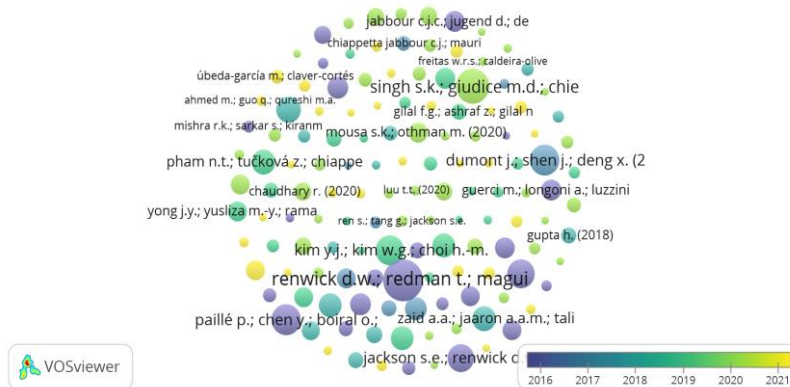
Cluster 1 (Red) originates from the human resources domain and has a combined link strength of 568 and an accuracy rate of 68. It encompasses topics such as resource management, environmental performance, green innovation, green human resources management, leadership, work satisfaction, green economy, and green creativity. Cluster 2 focuses on environmental management, personal training, green supply chain management, and sustainable development. Cluster 3 (Blue) focuses on the training of individuals, the management of human resources, the coordination of activities, the preservation of the environment, and the well-being of employees. Cluster 4 (Yellow) focuses on GHRM, sustainability, and green human resources.



**Figure 6.** Visualising a Network of Phrase Co-Occurrence Based on Title

## 4.9 Citation Analysis

### 4.9.1 Citation Analysis by Documents



**Figure 7.** Network Visualisation Map of the Citation by Documents

## **5 Discussion**

Implementing green human resources management can enhance comprehension of sustainable practices within the realm of human resource management. This encompasses the process of recognizing and comprehending the most effective methods for minimizing environmental impact, managing human resources in a sustainable manner, and incorporating sustainability objectives into policies. It aids in the identification of obstacles and difficulties encountered when adopting sustainable practices in the workplace (Nawangarsi & Sutawijaya, 2019). These obstacles may encompass cultural hurdles, policy modifications, employee resistance, as well as legal and regulatory constraints. Green human resources management facilitates the assessment of the effects of sustainable practices implemented by a business. This process entails quantifying and examining the ecological, societal, and financial effects of sustainable methods within the framework of human resource management.

Green human resources management facilitates the creation of conceptual frameworks that incorporate environmental and sustainability elements into human resource management. This model facilitates comprehension of the correlation between HRM practices and sustainable objectives, while also offering direction for formulating more sustainable plans and policies. Consequently, it generates practical suggestions for organizations to effectively adopt sustainable HRM practices. These proposals may entail the formulation of ecologically conscious rules and protocols, the establishment of training and awareness initiatives, and the implementation of incentives and rewards for employees who actively promote sustainable practices.

## **6 Conclusion**

The primary constraint is the restricted or fragmented availability of data. Obtaining pertinent data for research on Green human resources management may pose challenges due to its limited availability or lack of openness. Furthermore, there is the potential for bias in the existing data, including data that is limited to a specific segment of the population or particular organizations. Research on green human resources management must take into account the various organizational contexts, such as variations in size, industry sector, organizational culture, and other distinctive features. This can impede the ability to formulate universally applicable generalizations or derive overarching conclusions that are valid across all situations.

Green human resources management encompasses a range of interconnected aspects, including sustainable HRM practices, business culture, employee awareness, and external influences. Examining the impact of individual variables and comprehending their relationships can be a methodological challenge of considerable complexity. Green human resources management primarily emphasizes specific techniques, such as sustainable recruitment, environmental training, and sustainable performance management. This can lead to a restricted comprehension of the holistic framework of Green human resources management. Further comprehensive and exhaustive investigations are required to gain a complete understanding of the effects of sustainable practices. Green human resources management include the incorporation of limitations during the implementation process at the organizational level. Certain companies may encounter budgetary limitations, insufficient manpower, or internal opposition to reform. This could have an impact on the adoption of sustainable practices.



While there is existing study on the notion of Green human resources management, additional research is required to fully comprehend the difficulties encountered when implementing sustainable practices in the workplace. Further research is necessary to discover techniques and organizational culture for implementing Green human resources management, taking into account factors such as organizational resistance, lack of support from management, and cultural hurdles. Cultural elements, including the corporate values, conventions, and beliefs of individuals and groups within an organization, have the potential to impact the extent to which sustainable practices are adopted and succeed.

The research might concentrate on the development of more extensive assessment techniques and instruments to quantify the environmental and social effects of Green human resources management strategies. To effectively evaluate the effectiveness of sustainable practices and their influence on the environment and society, it is imperative to adopt a more organized methodology and utilize consistent metrics. Additionally, it is essential to investigate the involvement of employees in promoting and implementing Green human resources management. Further research can be conducted to examine the impact of employee awareness, motivation, participation, and engagement on sustainable practices, in order to gain a deeper understanding of how employees can effectively contribute to sustainability initiatives.

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