A Bibliometric and Meta Analysis on Green Human Resource Management for Sustainable Practices

1 Sarika Sahu, 2 Prof. Biswajit Satpathy
1Doctoral Scholar, Dept. of Business Administration, Sambalpur University
2 Professor, Dept. of Business Administration, Sambalpur University

Abstract

Since environmental destructions are the major cause of issues and challenges, management practices with environmental sustainability got a higher priority in recent business practices. Human Resource Management is also playing and contributing various functional strategies to convert the businesses into sustainable one. Environmental sustainability plays a vital role in this concern and therefore Green Human Resource Management is becoming more prevalent as businesses move towards sustainable organizations driven by high emissions and consumption. The study explores different research studies in connection with Green Human Resource Management and identified some concepts and scope for current and future investigations in the field of Human Resource Management. The objective of the current study is to provide a through literature review to support the understanding and concepts for the applicability of GHRM in corporate settings and respond to this emerging phenomenon. The study adopts systematic literature review and meta analysis both to map the theme evolution and conceptual clusters associated to the keywords using Bibliometric analysis. The study includes various analysis, including scientific mapping and performance analysis using Biblioshiny software in Rstudio and Vosviewer software. The paper enhances the insight knowledge of GHRM in the field of management showing the recent trends and various approaches to measure the implementation and application of the same in the corporate world. The research furnish a complete sketch of GHRM including conceptual and methodological aspect forming the research a specific guide where researchers shall be encouraged to expand and broaden the area for future potential investigation.

Keywords: Human Resource Management; Green Human Resource Management; Bibliometric analysis; Meta Analysis; Sustainability

JEL Classification: M1, O15, M12

Introduction

Organizations have been comprehensible for climate emergency and their harmful emissions and sewage into the natural environment are getting more emphasis in recent research (Robertson and Baling, 2017; M. Farrukh et al., 2022). For the conservation of natural ecosystem, management researchers are taking greater efforts and are more concern for ensuring sustainability since few decades (Yong, Yusliza, Ramayah, et al., 2020). All the industry has embraced environmental protection practices by adopting various strategic management approach including environmental management and other necessary implementation linking with environmental concerns (Fawehinmi et al., 2020). The majority of manufacturing businesses have improved their organizational environmental performance by focusing to get rid of waste and disposal generated from the production process (Kim et al., 2019a). In general, this circumstances are the results of the global emergency for sustainability which has gained steam recently in the ASEAN countries and instigate organizations to be environmentally sensitive within the time horizon of achieving sustainable development goals (Haldorai et al., 2022)(Yong et al., 2020; K. Haldorai et al.,2022). However, the recent changes in the pattern of climate changes have prompted and increased pressure on various organizations to transit environmentally sound business strategies. There is an increased pressure from national and international regulatory bodies for climate protection and fostering sustainable and eco friendly business in order to ecological degradation (Asante et al., 2021; L. Tweneboa Kodua et al., 2022). As a result of increased awareness of environmental issues brought about by the UNFC (United Nations Framework Convention) on Climate Change, and other national and international forums, all participating nations decided to implement sustainability program using different strategic approaches (Choudhary & Datta, 2023).

Nowadays the economy is shifting towards sustainable and environmental friendly setup which can also considered as the stage of development for a particular organization and a nation. Therefore researchers found a new line of investigation in the domain of Human Resource Management as "Green Human Resource Management" or "Environmental Human Resource Management". With the increasing trends and challenges from industrial pollution which cause a greater effect towards environmental degradation, the concept of sustainability, "environmental management", "green management" and many more terms and concepts evolved. Likewise in the field of HRM, the

term "Green Human Resource Management" came into the world of management for green and sustainable management practices (Gim et al., 2022). In 1996, the concept of Green HRM was published by Wehrmeyer (1996) in an edited book entitled greening people: human resources and environmental management(D. Renwick & Robertson, 2008). It receives an impactfull attention from the researchers, management's practitioners both nationally and internationally. Green human resource management or GHRM is the term which means producing human resource who promotes green performance and behavior and foster pro-environmental beliefs and behaviors among themselves (Tang et al., 2018; P.K. Muisyo and S. Qin, 2020). However GHRM practices can build or facilitate the implementation of green policies and practices in its various process and functions such as recruitment, compensation, rewards, and performance management (Renwick et al., 2013; Q.A. Nisar et al., 2021). Hilton hotels, for instance, have implemented green practices that have allowed them to reduce their energy and water use by 14.5% and 14.1%, respectively, between 2009 and 2014. (Kim et al., 2019; M. Yes̨iltas̨ et al., 2022). Environmental management techniques have been embraced by almost all industries, and they have shown gains in productivity through efficient waste management and timely disposal of hazardous pollutants. Researchers have found a many ways to explore the concept and trends in green human resource field. Since it is an integration of human resource management and environmental management (Renwick et al., 2008), researchers found a new line of study in business and management field for the attainment of sustainability. The demand for sophisticated management abilities has grown dramatically as a result of green HRM, which also has the power to alter how businesses make decisions and carry out different tasks. Despite the fact that green HRM has gained popularity in the last ten years and is mentioned in literature, (Agarwal et al., 2022) and also dating back to 2022, Green HRM was propped even earlier in the research study (D. W. S. Renwick et al., 2013) released in 2013 and also in 2008 (D. Renwick & Robertson, 2008). For many years, the pursuit for a newer approach in the field of Green HRM has been made with a large volume of empirical and qualitative research which has added to the development of advanced management practices and adoption of HRM involvement in environmental management which generate meaningful insights for the businesses.

Every field's knowledge base grows throughout time as a result of the theoretical and conceptual advancements assemble by researchers in specific field. Therefore, in order to comprehend the present scenario of research in the current study and to draw conclusions for the scientific community and management researchers, it is imperative that the knowledge already collected be reviewed on a regular and systematic basis. In lieu with this tendency the study has been carried out.

The total study is divided into two main broad categories. First the entire study is based upon Bibliometric analysis including dataset procurement and data set refinement for systematic and visual analysis of various literatures relating Green Human Resource Management (Kainzbauer et al., 2021; Rashidi et al., 2020; Herrera & de las Heras-Rosas, 2020). This section includes all the detail bibliometric results analyzed in different software including reputed journals, citation analysis, relevant documents, and scientific production of articles by considering different laws. Therefore, this study's bibliometric review approach would aid in answering the following queries. And the second part consists of Meta analysis with systematic and critical analysis of papers with various themes and objectives. This section includes the mechanism which describes the recent trends and antecedents in the implementation of GHRM and sustainability. It shows the entire effect on environmental performance of the firms by critically analyzed the findings from different empirical studies. To map the theme progression and conceptual clusters associated to keywords of Green Human Resource Management using the Scopus platform, the study uses both bibliometric and Meta reviews. The study includes numerous analyses, including scientific mapping and performance analysis of the current study in the management field, using bibliometric analysis in Biblioshiny software in Rstudio and Vosviewer. The study discovered a number of themes and areas where the subject of GHRM exists using Meta analysis.

Objectives

- To identify the top authors that contributed to researches on Green Human Resource Management and what is the impact of their research using scientific mapping.
- To identify the leading organizations, nations, and journals those have made contributions to this field.
- To analyze how GHRM revolutionizes management research in conjugating sustainability research domain using Meta Analysis.
- To evaluate the concepts for a possible investigation or upcoming research in this field?

Review methodology and initial data statistic

The entire study is objectified with extensive literature review process. The current study adopt systematic review followed by bibliometric and meta analysis to explore the GHRM in the subject of Business Management and Accounting (Choudhary & Datta, 2023) The purpose of the literature review is to help scholars categorize and

summarize earlier studies of green human resource management. (Khan & Muktar, 2021; (Hameed et al., 2020). While identifying the theoretical stances and salient features of published papers and assisting in the development of a framework for future study are important aspects of the systematic literature review, its overall objective is more expansive. As systematic literature review gains a broader aspect, the researcher adopt the statistical method of analyzing and combining findings from several similar studies using Meta and bibliometric analysis(Choudhary & Datta, 2023). Bibliometric analysis has been used to analyze and draw considerable results on prominent authors, most cited sources and documents, co-authorship, geographical distributions in the study of Green HRM. (Herrera & de las Heras-Rosas, 2020; Murillo-Ramos et al., 2022; Sandria & Wardhana, 2021). Citation counts are used in bibliometric maps as a metric to assess the integration and influence of the study. Using VOSviewer and Biblioshiny, the data has been analyzed in variety of factors to draw citation analysis, co-occurrence, and co-citation analysis including author's contribution with networks within stipulated time period. (Farrukh et al., 2022). The program requires a CSV file containing header information about the article, such as topics, years, DOI, abstract, citation, keywords, author 's information and other bibliographic information such as source, publisher, funding agencies and references. Table 1 provides specifics on the data selection procedure.

Relevance of using Bibliometric analysis

The term "Bibliometrics" was first used by Pritchard in 1969 as "the application of mathematics and statistical methods to books and other media of communication". Basically is it a statistical approach to describe the creations and creator of different literatures (Budd, 2019). Citation analysis of research output and publications is a common topic of this statistical examination of bibliometric data. Earlier the use of bibliometric analysis was very frequent in library and information science. Nowadays, it is trending in every domain. As per as the domain of Human Resource Management is concerned, there is very limited study exist, which include both Bibliometric analysis and Meta Analysis. The main feature of this study is that it offers a thorough evaluation of the major nations, organizations, books, and authors, as well as the most cited works and forthcoming research directions in GHRM. It is employed to offer quantitative analysis of scholarly works. Bibliometric analysis is frequently utilized in citation analysis which includes graphs and networks. It is also used by different discipline to explore the impact of their subject and concept. As per the definition is concerned, Bibliometric consist of two words "Biblio" Means Books and Metrics means Measurement. This approach measures the influence of published publications by statistically analyzing the citations within them.

Six-phase bibliographic search refining

The phase wise refinement is done to display a clear and systematic review process in the study. For systematic review, the entire refinement process had undergone six phases. The study took several methods and statistical ways in the subject to characterize the depository of articles on GHRM to understand the trends of concepts in published documents.(Sahoo, 2022). This method of structural reviewing of published literatures is called Scientometric (Murillo-Ramos et al., 2022)analysis, which is carried out by thorough search of keywords, selection of database, selection of keywords and hence prepared the bibliography to provide a complete information of past research in the study or investigation (Rashidi et al., 2020). In order to identify pertinent published papers and different conceptual and empirical research that has been already published the author's employs a six-phase refinement approach for data collection and systematic review methodology. Numerous of study that uses bolometric analysis with several phase/stage refinement as methodological approach exist in the field of business and management. The current study also adopt the refinement process which consist of : (1)Keywords with logical operators and combination of words (Khan & Muktar, 2020); (2) the search query (Farrukh et al., 2022) (3) the literature search approach of the study (Maditati et al., 2018) and (4) the retrieval keywords and title function for the study (Sadeghi-Niaraki, 2023) Table 1 displays the search query string used in each step as well as the search results for each phase.

Table 1. Six phase bibliographic search and results.

Search refinement phase	Search query	Search results (no. of document)
Phase 1	TITLE-ABS-KEY ("Green human Resource Management")	575
Phase 2	TITLE-ABS-KEY ("Green human Resource Management") AND (LIMIT-TO(SUBJAREA, "BUSI"))	373

Phase 3	TITLE-ABS-KEY ("Green human Resource Management") AND (LIMIT-TO(SUBJAREA, "BUSI")) AND (LIMIT-TO (DOCTYPE, 'ar'))	317
Phase 4	TITLE-ABS-KEY ("Green human Resource Management") AND (LIMIT-TO(SUBJAREA, "BUSI")) AND (DOCTYPE, 'ar')) AND (LIMIT-TO (LAN-'ENG'))	314
Phase 5	TITLE-ABS-KEY ("Green human Resource Management") AND (LIMIT-TO(SUBJAREA, "BUSI")) AND (DOCTYPE, 'ar')) AND (LIMIT-TO (LAN-'ENG')) AND (LIMIT-TO (PUB 'FINAL'))	270
Phase 6	Search refinement by ABDC-A*/A Categorized journals Journal of cleaner production A 31	81
	International journal of manpower A 21	
	International journal of hospitality management A 8	
	Business strategy and the environment A 8	
	International Journal of Human Resource Management A 6	
	Human Resource Management A* 4	
	Journal Of Business Ethics A 3	

Above table clearly shows the first phase which started with the keyword or query with cover a broad area which is taken from Scopus database. The query comprises the combination of three things namely Article title, Abstract and keywords which can also be explained as "Title-ABS-KEY" which means the results appears by combining all the three aspect in different papers. The keywords searches for bibliometric analysis include "Green Human Resource Management" which resulted in 574 documents. This double quote terms was used with a specific objective to draw the exact term of the title which can be seen in each paper or we can say to reduce the additional and undesirable documents. The second phase focus on subject area which is limited to 'Business, Management and Accounting', which is resulting in 373 documents. Again the third phase refinement specify journal articles (excluding conference papers, book chapters, review, conference review, book, editorial and note) based only which results in 317 documents. Going to fourth phase, the author eradicate the language barrier by limiting the documents into English language for reducing ambiguity, which comes with 314 documents and in the fifth stage the author confirmed to pick the final publication which results in 270 documents. At the 6th phase refinement, the emphasis has been given on published articles in reputable quality journals. The Australian Business Deans Council (ABDC) suggested list of Quality Journals 2022 contained only A* and A rated source journals for the sixth phase of refining, which produced 81 research papers from 7 source titles. This forms the sample of the current study. As per as year is concerned, the range from 2014 to 2023 has been taken resulted from all the sixth refinement. These findings suggest that between 2014 and 2020, the idea of "Green HRM" was quite faded and new in the Human resource management research domain.

Descriptive results of top contributing authors, sources, geographical origin and countries collaboration

Table 2 summarizes the number of articles published in each journal from 2014 to 2023. According to the analysis the top contributors were Journal of Cleaner Production (JCP) with 31 articles, International Journal of Manpower (IJM) with 21 papers, Business Strategy and the Environment (BSE) and International Journal of Hospitality Management (IJHM) with 8 papers each. This result clearly shows the seven eminent sources which are contributing the research in the subject of Green HRM. The table also consists of yearly production of documents in each source, which shows the International Journal of Manpower (IJM) has the highest production of 12 articles in the year 2022 as compared to other journal as well as preceding years.

Table 2. Yearly characteristic of Publications in ABDC categorized journals from 2014 to 2023.

Sources	Code	ABDC Category	No. of Articles	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
JOURNAL OF CLEANER PRODUCTION	JCP	A	31	0	2	4	2	1	6	5	7	3	1
INTERNATIONAL JOURNAL OF MANPOWER	IJM	A	21		0	0	0	0	0	8	0	12	1
BUSINESS STRATEGY AND THE ENVIRONMENT	BSE	A	8	0	0	0	0	0	2	2	2	0	2
INTERNATIONAL JOURNAL OF HOSPITALITY MANAGEMENT	IJHM	A	8	0	0	0	0	0	1	2	0	3	2
INTERNATIONAL JOURNAL OF HUMAN RESOURCE MANAGEMENT	IJHRM	A	6	0	0	4	0	0	0	0	0	1	1
HUMAN RESOURCE MANAGEMENT	HRM	A*	4	0	0	0	1	0	0	0	0	1	2
JOURNAL OF BUSINESS ETHICS	JBE	A	3	1	0	0	0	1	0	1	0	0	0
Total			81	1	2	8	3	2	9	18	9	20	9

Analysis of sources and the scientific production can be understood by two Bibliometric laws formulated by Bradford and Lotka namely Bradford's law and lotka's law applied to the numbers of literatures in different disciplines (Budd, 2019). Bradford's law is a pattern that quantifies the exponentially decreasing returns of looking up references in scientific journals. It was first reported by Samuel C. Bradford in 1934. In order to research the demand for scientific journals, he created Bradford's law. And his work influence bibliometric and citation analysis of scientific publication. Here this law is analyzed in Biblioshiny software in "R" which directly shows the result which is reflected in table 3. This law works in the following strategies. The number of journals in each category will be proportional to 1: n: n², where n is the number of articles, if journals in a field are sorted by number of articles into three groups, each containing around one-third of all articles. Table 3 shows the three zones containing the same number of articles as the above nucleus and Journal of Cleaner Production having the highest frequency coming under rank 1 and zone 1 having 31 documents out of 81. There are several numbers of related publications in lieu with this principle. In many disciplines, this pattern is also called a pereto distribution.

Table 3. Core sources by Bradford's law

Core sources by Bradford's law				
SOURCES	Rank	Frequency	Cum Frequency	Zone
JOURNAL OF CLEANER PRODUCTION	1	31	31	Zone 1
INTERNATIONAL JOURNAL OF MANPOWER	2	21	52	Zone 2
BUSINESS STRATEGY AND THE ENVIRONMENT	3	8	60	Zone 2
INTERNATIONAL JOURNAL OF HOSPITALITY MANAGEMENT	4	8	68	Zone 3

INTERNATIONAL JOURNAL OF HUMAN RESOURCE MANAGEMENT	5	6	74	Zone 3
HUMAN RESOURCE MANAGEMENT	6	4	78	Zone 3
JOURNAL OF BUSINESS ETHICS	7	3	81	Zone 3

In 1926, Lotka's law, named after Alfred J. Lotka is one of the scientific distributions for the productivity of authors (Friedman, 2015). It shows and describes the frequency of publication by different authors in any particular field. That allows us to calculate the frequency table of the distribution of the eminent literary author's productivity. It helps the researcher to find out the exact gap by referring all the eminent literature in a specific field. According to the law, the number of authors who contribute during a given time frame is less than the total number of authors who contribute all at once. It follows the formula $1/n^2$ which is an inverse square law, which means there is a predetermined ratio between the number of authors who publish a given number of articles and the number of authors who publish a single article. It signifies, as the number of articles published increases, publications of those authors become less frequent. Table 4 shows the distribution of production of papers by authors in different proportion. According to this table, 86% of all contributors make a single contribution, with the number of writers making n contributions accounting for roughly $1/n^2$ of those producing one.

Table 4. Scientific production by Authors by Lotka's Law

| Lotka's Law		
Documents written	**N. of Authors**	**Proportion of Authors**
1	220	0.866
2	28	0.11
3	2	0.008
4	2	0.008
5	1	0.004
6	1	0.004
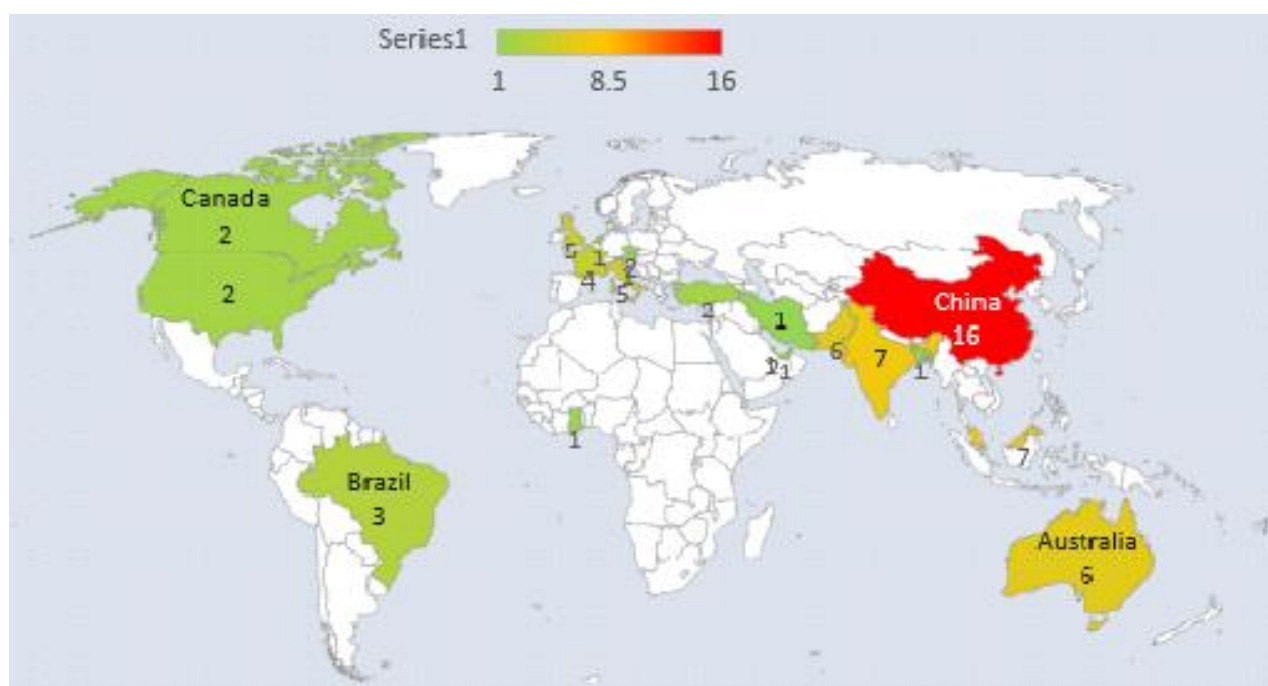
Figure1. Geographical origin of top contributing authors (Analyzed in Excel)

Focusing on the geographical origin of top contributing authors in the field of Green HRM, majority of publications were made in Asian countries among which, China is the top contributing in this research field. The SCOPUS database was utilised to extract the authors' geographical origins, which were then visualised on a global map using a heat map. The authors' places of origin that contribute to the current analysis's research area are displayed in Figure 1. The resulting global heat map, whose colour varies from green to red to represent areas of low density (1-8.5) and high density (8.5-16) of published research articles, provides an interactive means of determining each nation's contribution. The most contributing country with higher density is seen in China, India, Malaysia Australia and Pakistan. Table 5 represents the distribution of all documents reflected from different continent as well as countries . Most of the continent like Asia, Australia and Europe draws maximum percentage in the research of Green Human Resource management. China shows maximum 16 percent from total documents.

Table 5. Summary of geographical origin of research contribution

Continent	Country	Articles	Percentage
EASTERN ASIA	China	16	19.75
SOUTHERN ASIA	India	7	8.64
SOUTH-EASTERN ASIA	Malaysia	7	8.64
AUSTRALIA (OCEANIC)	Australia	6	7.40
SOUTH-EASTERN ASIA	Pakistan	6	7.40
EUROPE	Italy	5	6.17
EUROPE (NORTH-WEST)	United kingdom	5	6.17
WESTERN EUROPE	France	4	4.93
N/A	N/A	4	4.93
SOUTH AMERICA	Brazil	3	3.70
NORTH AMERICA	Canada	2	2.46
CENTRAL EUROPE	Czech republic (Czechia)	2	2.46
SOUTH- WESTERN ASIA	Qatar	2	2.46
WESTERN ASIA	Turkey	2	2.46
NORTH AMERICA	U.S.A	2	2.46
AUSTRALIA	N/A	1	1.23
WESTERN ASIA	Bahrain	1	1.23
SOUTHERN ASIA	Bangladesh	1	1.23
WEST COST AFRICA	Ghana	1	1.23
SOUTHERN ASIA	Iran	1	1.23
EASTERN ASIA	Korea	1	1.23
WESTERN EUROPE	Netherlands	1	1.23
WESTERN ASIA	United Arab emirates	1	1.23
	Total	81	100

Overall, in fig 2, geographic dispersion suggests that reputable academic institutions from all around the world have expressed interest in studying "Green HRM." The analysis is done in Biblioshiny using Rstudio taking the collaboration of relevant countries as per their respective affiliations. In Fig.2 there is collaboration between different countries with a top connection of China and Australia followed with the more collaborated countries such as USA India, France, UK, Pakistan, Malaysia and Italy. The picture shows the collaboration of different countries with a higher connection between China, Malaysia, India, Pakistan, U.K, Australia, Italy, France and U.S.A. Among all Australia and China shows the highest collaboration.
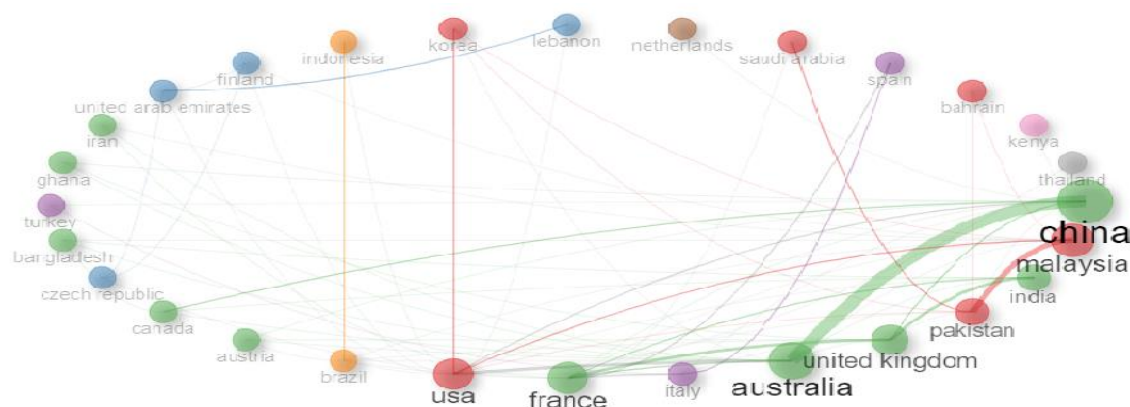
Fig2. Collaboration network of different countries

In table 6 some relevant affiliations were shown with their yearly production of articles from 2014 to 2023 which shows the increasing trend of publication in the resent theree to 4 years. University of Malaysia, Terengganu has the maximum number of publication among all affiliation with ten numbers each year from 2020 onwards. Xi'an Jiaotong University in China has also the maximum no of publication after Malaysia with 10 documents in 2022 and 10 in 2023 in the recent times. These data is extracted by analysing the total number of published documents with respect to their affiliation in Biblioshiiny sotware.

Table 6. Yearly characteristics of some relevent affiliations

Most Relevant Affiliation		Affiliations' Production over time									
Affiliation	Articles	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
UNIVERSITI MALAYSIA TERENGGANU	10	0	0	0	0	0	2	10	10	10	10
XI'AN JIAOTONG UNIVERSITY	10	0	0	0	0	0	0	0	2	10	10
NATIONAL INSTITUTE OF INDUSTRIAL ENGINEERING (NITIE)	7	0	0	0	0	0	2	2	5	5	7
FLORIDA STATE UNIVERSITY	6	0	0	0	0	0	3	3	3	3	6
UNIVERSITÀ DEGLI STUDI DI MILANO	6	0	0	4	4	5	6	6	6	6	6
UNIVERSITI SAINS MALAYSIA	6	0	0	0	0	0	1	3	4	6	6

Descriptive analysis of Key words, co occurrence globally cited keywords, word cloud and complete analysis of themes

Keywords analysis

Analysis of keywords with their co-occurrence is analyzed in VOSviewer by using Scopus dataset with all required bibliographic data. These co-occurrence of different themes generated to understand the gap and underpin the knowledge of GHRM properly and to consider the significant variables for future research (Sadeghi-Niaraki, 2023). Figure 4 clearly represent the four dominant cluster which includes Corporate Social Responsibility, GHRM, green creativity , Green HRM, pro-environmental Behavior, Social Identity Theory and sustainability in cluster 1 while cluster 2 relates to Green supply chain management and sustainable operations. Environmental management, environmental sustainability and human resource management emerged in cluster 3and cluster 4 related to environmental training or green training. The network visualizations also states that cluster 1 has more prominent

research theme as compared to clusters 2, 3 and 4. It can be seen in Figure 4 that Green Human Resource Management has a strong integration with corporate social responsibility, sustainability, sustainable operation, green training and many more.

Fig3. Network visualization of author's keyword in vosviwer.
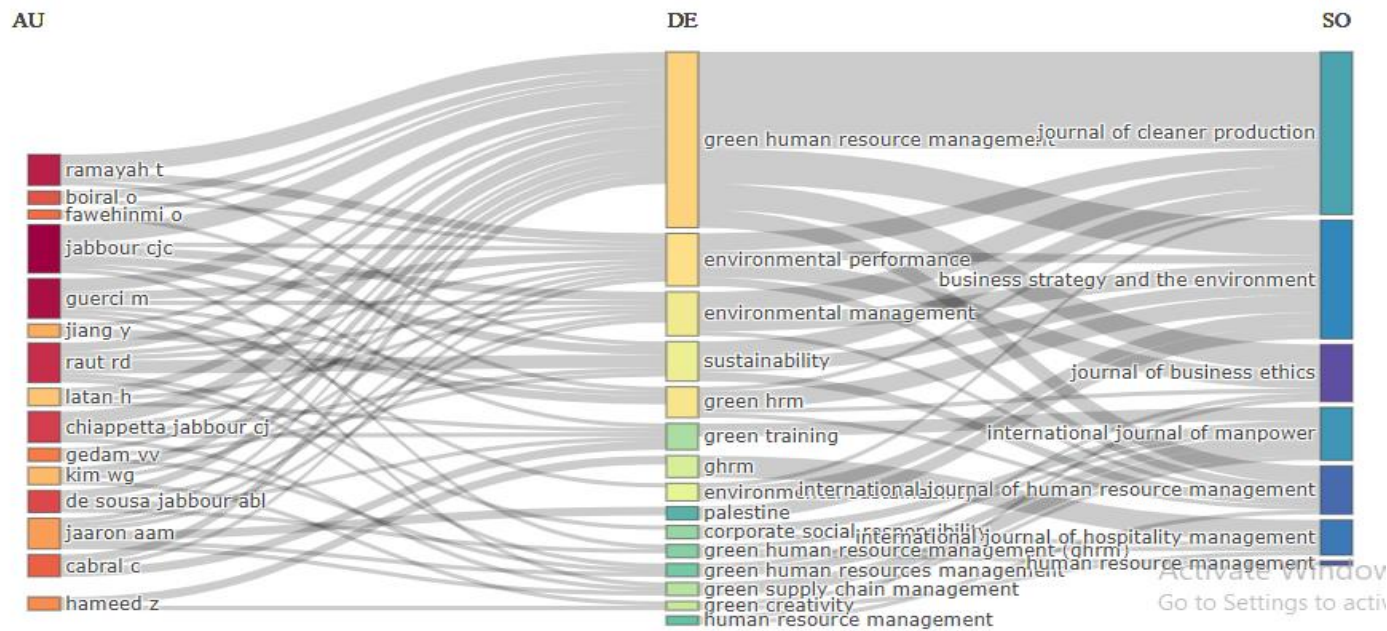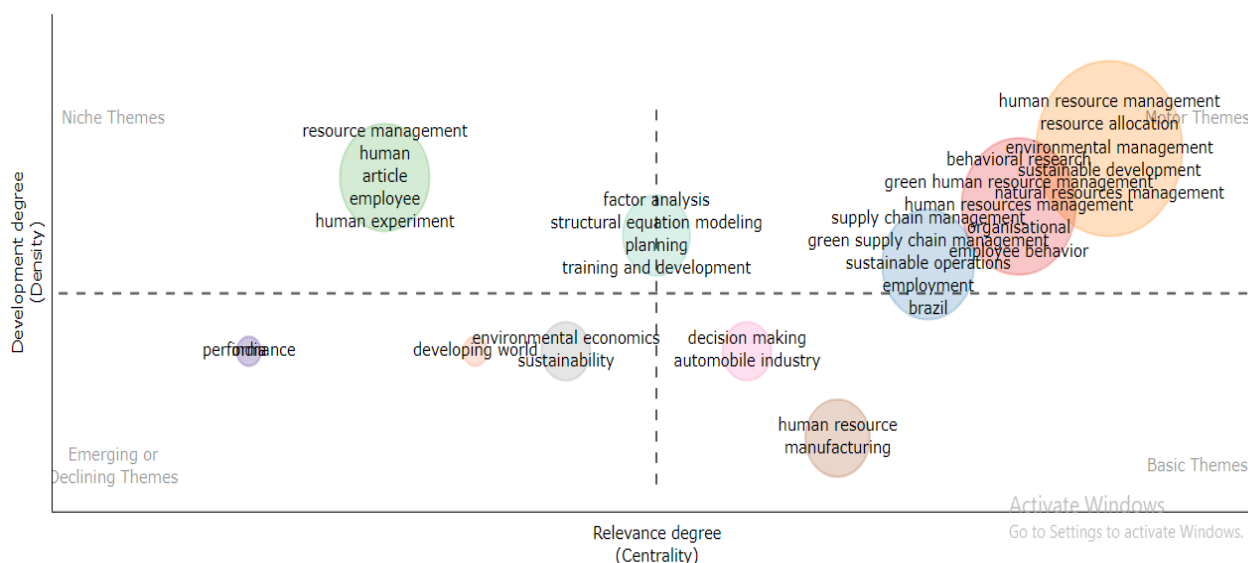

Fig 4. Three-field plot analysis of 15 authors, 15 keywords and 15 source titles.

A three-field plot analysis of authors, keywords and sources are performed in Biblioshiny to classify and show the degree of association among each. Figure 4 displayed the relationships between the top 15 authors, the top 15 research keywords, and the top 15 major journals. All 15 top authors conducted and published research that bears the "Green Human Resource Management" as keyword. The greater importance and emphasis can be seen with the height of each box and thickness of all connecting lines. The more information or volume of work performed, the taller the box and the stronger the lines correlation.

Table 7.Trendy topics in the field of Green HRM

Items	freq	year_q1	year med	year_q3
sustainable operations	5	2016	2016	2017
green supply chain management	5	2016	2017	2018
supply chain management	7	2016	2018	2019
natural resources management	13	2017	2019	2021
personnel training	7	2017	2019	2020
human resource management	30	2017	2020	2021
resource allocation	23	2018	2020	2021
environmental management	21	2018	2020	2021
behavioral research	9	2020	2021	2021
green human resource management	9	2021	2021	2022
human resources management	9	2021	2021	2022

Again by analyzing the documents in Biblioshiny by taking total 50 words, a word cloud consisting most 50 important word from Authors keywords reflected as depicted in fig.4. The word cloud formed with multiple colours is extracted by taking 50 documents and authors keyword as the analysis protocol. Most of the highly used words reflected from the results are Environmental Managemnet, Green HRM, Sustainability, environmental sustainability, green creativity, green training and green supply chain mangemnet.

Fig 5. Word cloud analyzed in Biblioshiny software (Rstudio)

Fig 6. Thematic map Analysis

However, an analysis of the trending topic based on authors keywords from the scopus dataset was conducted in Biblioshiny by taking some parameters to show the state of some keywords in recents time horizon. Apart from word cloud, another analysis namely themapic map of GHRM is conducted in the study. The aim of the analysis is to ascertain the insight knowledge into the current field, its significance , its status and future holds. It promote a guidline to the professionals as well as rsearchers regarding the future redearch dimentions and areas of thematic analysis within the field.

Important themes were derived from this analysis by grouping author keywords together and examining their relationships and connections. Several properties (density and centrality) determine these topics where the horizontal axis describe the centrality, and the vertical axis shows density. Centrality can be defined as cohesiveness between nodes, density measurements, and the degree of correlation between various themes. Both the characteristics measures and assess the importance and emergence of various topics. The place of the nodes and its centrality increase with the number of relatinship with other nodes in the thematic network. In a similar vein, the cohesiveness of a node, which stands for the density of a research field, defines its ability to grow and endure. The GHRM theme map is essentially split into four quadrants, numbered Q1 through Q4. The primary topic is found in Q1, whereas highly developed and specialised themes that connect to the main theme are found in Q2. Q4 is made up of foundational and transversal themes, while Q3 is made up of vanishing or emerging ideas. Driving themes are shown in the upper right quadrant, underlying themes in the lower right quadrant, highly specialised themes in the upper left quadrant, and emerging or vanishing themes in the lower left quadrant. It can be visible in the fig.5   that themes namely human resource mangement, green human resource mangemnet, resource allocation, green supply chain managemnet, employee behaviour, sustainable operations and natural resource management are well developed and are frequently used in structuring the field of GHRM. These are the leading themes in the field of GHRM.

Descriptive analysis of prominent Authors

Both vos viwer and Biblioshiny softwares were used to analyze the bibliographic dataset for finding most cited authors and their documents. Table 8 shows the top 10 most cited authors in the field of GHRM research which shows an notable interest in the field of management. As results shown in Table 8 that, Jabbour CJC has the highest frequency and highest production with highest citation.

Table 8. Top ten Author's having highest citation

Authors production over time				
Author	year	frequency	Total Count	Total Count Per Year
JABBOUR CJC	2016	3	798	99.75

DE SOUSA JABBOUR ABL	2016	2	605	75.625
GUERCI M	2016	3	500	62.5
BOIRAL O	2014	1	466	46.6
RAMAYAH T	2020	2	366	91.5
JABBOUR CJC	2015	2	339	37.667
JABBOUR CJC	2019	1	292	58.4
CHIAPPETTA JABBOUR CJ	2020	2	243	60.75
DE SOUSA JABBOUR ABL	2015	1	205	22.778
FAWEHINMI O	2019	1	196	39.2
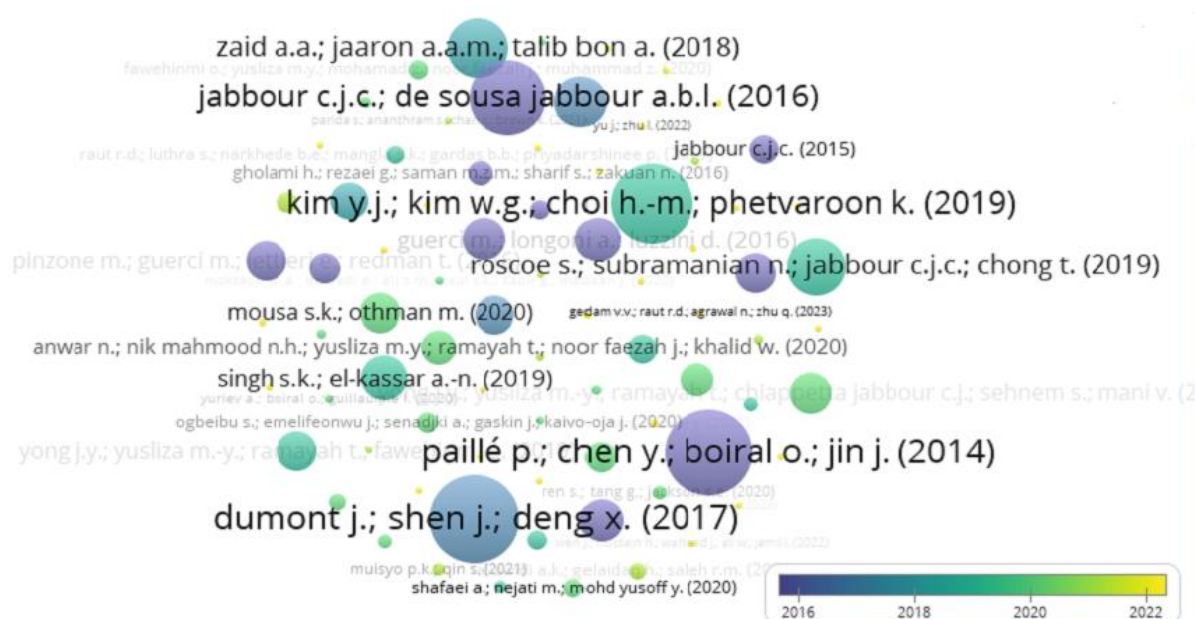
Fig. 6. Overlay visualization of prominent authors with their modt cited documnets

Table 9. Overall information of top cited documents in the field of Green HRM

| Paper	DOI	Total Citations	TC per Year	Normalized TC
DUMONT J, 2017, HUM RESOUR MANAGE	10.1002/hrm.21792	477	68.14	1.56
PAILLA‰ P, 2014, J BUS ETHICS	10.1007/s10551-013-1732-0	466	46.6	1
KIM YJ, 2019, INT J HOSP MANAGE	10.1016/j.ijhm.2018.04.007	429	85.8	2.5
JABBOUR CJC, 2016, J CLEAN PROD	10.1016/j.jclepro.2015.01.052	394	49.25	2.02
ZAID AA, 2018, J CLEAN PROD	10.1016/j.jclepro.2018.09.062	312	52	1.27
ROSCOE S, 2019, BUS STRATEGY ENVIRON	10.1002/bse.2277	292	58.4	1.7
MASRI HA, 2017, J CLEAN PROD	10.1016/j.jclepro.2016.12.087	254	36.29	0.83
SINGH SK, 2019, J CLEAN PROD	10.1016/j.jclepro.2018.12.199	220	44	1.28
GUERCI M, 2016, INT J HUM RESOUR MANAGE-a	10.1080/09585192.2015.1065431	218	27.25	1.12
TEIXEIRA AA, 2016, J CLEAN PROD	10.1016/j.jclepro.2015.12.061	211	26.38	1.08
JABBOUR CJC, 2015, J CLEAN PROD	10.1016/j.jclepro.2014.09.036	205	22.78	1.21
YONG JY, 2020, BUS STRATEGY ENVIRON	10.1002/bse.2359	204	51	2.36
PINZONE M, 2016, J CLEAN PROD	10.1016/j.jclepro.2016.02.031	197	24.63	1.01
YONG JY, 2019, J CLEAN PROD	10.1016/j.jclepro.2018.12.306	196	39.2	1.14
RENWICK DWS, 2016, INT J HUM RESOUR MANAGE	10.1080/09585192.2015.1105844	193	24.13	0.99
MOUSA SK, 2020, J CLEAN PROD	10.1016/j.jclepro.2019.118595	191	47.75	2.21
NEJATI M, 2017, J CLEAN PROD	10.1016/j.jclepro.2017.08.213	188	26.86	0.61
LONGONI A, 2018, J BUS ETHICS	10.1007/s10551-016-3228-1	178	29.67	0.73
ANWAR N, 2020, J CLEAN PROD	10.1016/j.jclepro.2020.120401	162	40.5	1.88
PHAM NT, 2020, INT J HOSP MANAGE	10.1016/j.ijhm.2019.102392	154	38.5	1.78

Table 9 shows the overall information of top cited documents with mor ethen 100 citations, clearly shows the DOI, total citation, total citation per year and normalized cittaion. Dumont, 2017, Pailla. P, 201 and Kim. Y.J, 2019 have the highest citation in the field of GHRM. These documents with respective authors have multiple papers in the same field. Hence, these authors are most prominent and main contributers in theis domain.

Fig.7 Network visualization of top cited Authors in the field of GHRM.

Fig.7 shows the network visualization of prominent highly cited authors in the field of GHRM. The data has been analysed in vosviewer by taking citation as type of analysis based on authors which clearly shows the important authors having highest no of citation.
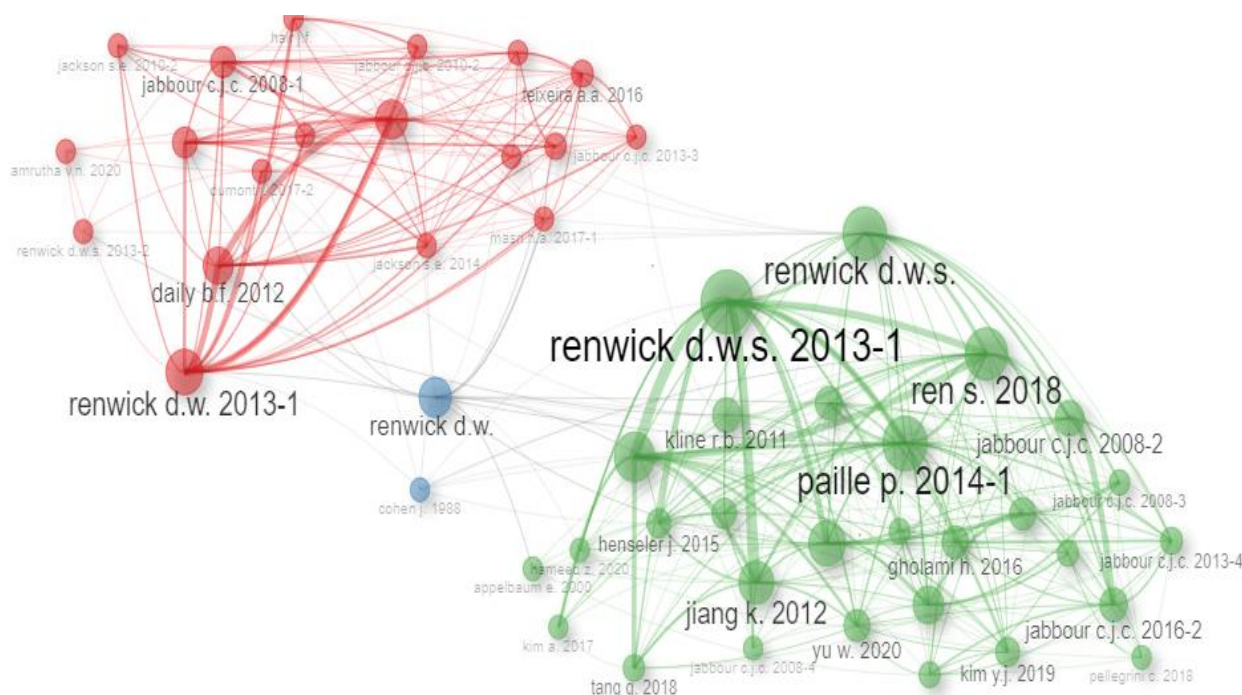
Fig 8. Clusturing by Coocitation network of papers

Fig 8. Shows the clusters made by the coocitation of papers, which neatly shows the diagram of the frequency with which two papers or documents are cited together by another documents. It simply means that, if at least one other document cites two documents in common basis, these two documents are said to be cocited. By this concept, two clusters were made by coocitation network of papers analyzed in Biblioshiny. In both the cluster, Renwick d.w.s 2013,

is the common document which is coocited by other document and thereby making two different clusters.

Discussions relating Meta review and critical analysis of Results

Although there are various documents published with systematic literature reviews and meta-syntheses in GHRM, (Khan & Muktar, 2020) (Yong, Yusliza, & Fawehinmi, 2020) (Paulet et al., 2021)(Pham, Hoang, et al., 2020) most of them are related with only bibliometric analysis, lack of insight study and lack of justifications of the applicability of the new term GHRM and its relationship between different variables such as on corporate sustainability and environmental performance. There is a gap of integration of different organizational and individual antecedents in the study of GHRM. They leave unanswered some questions about the effect of GHRM on corporate sustainability which is lying in the three bottom line orientation of People, Planet and Profit. This paper considered all the studies including quantitative and qualitative published in top reputed journal in the Scopus database which is a vast reservoir of management research. The paper analyses the systematic methods to find the direction of the effectiveness GHRM towards sustainability by exploring theoretical and methodological approaches undertaken in different papers.

The stydy follows the research objective which cover intensive literature review on impacts of GHRM on corporate sustainability and environmental performance which also provided the integration of GHRM practices with constructs such as employee green behaviour, Organizationla citizenship behaviour for environment, competetive advantage, Proenvironmental behaviour both at individual and organizational level. This study relied on both bibliometric and meta analysis, the author took two systematic procedures to explore the concept find the and future research agenda. The first step in the process is a continuous and thorough bibliometric study that combines performance analysis, scientific mapping, network analysis, and reference analysis. The second method integrated and supported the first approach, which has already been applied in the sustainability literature. It involved a critical in-depth analysis of a specific sample of articles gathered through the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-analysis) structured procedure. (Barbosa et al., 2023). The meta analysis follwed by PRISMA method consider the initial data screening referring the bibliometric search from scopus database. The data refinement results in 81 literatures on GHRM taken from top ranked journal (ABDC, A/A* Category). Then the dataset is objectify to analyse and explore the impact of GHRM for environmental performance and green and sustainable business environment. The data screening process starts with searching documents including GHRM as a term in the title, which results in 62 documents. Again for proper inclusion of documents, all the abstract and titles were analysed to get 47 papers on effects of GHRM with various antecedents. To avoid the complexity to find the inference between GHRM into a stable direction, the author critically examine various themes relating to various objectives. The study search for several questions such as, What is the relationship between GHRM and corporate sustainbaility? What is the finding related GHRM and environmental performance? What are the moderating and mediating elements in accessing GHRM or How GHRM can be implemented and with which variables and measures it is operating in most papers? All the answers to these questions were combined to screen the papers by focusing different objectives, such as relationship between GHRM and environmental performance, environmental and corporate sustainability and green antecedents both in individual and organizational level.
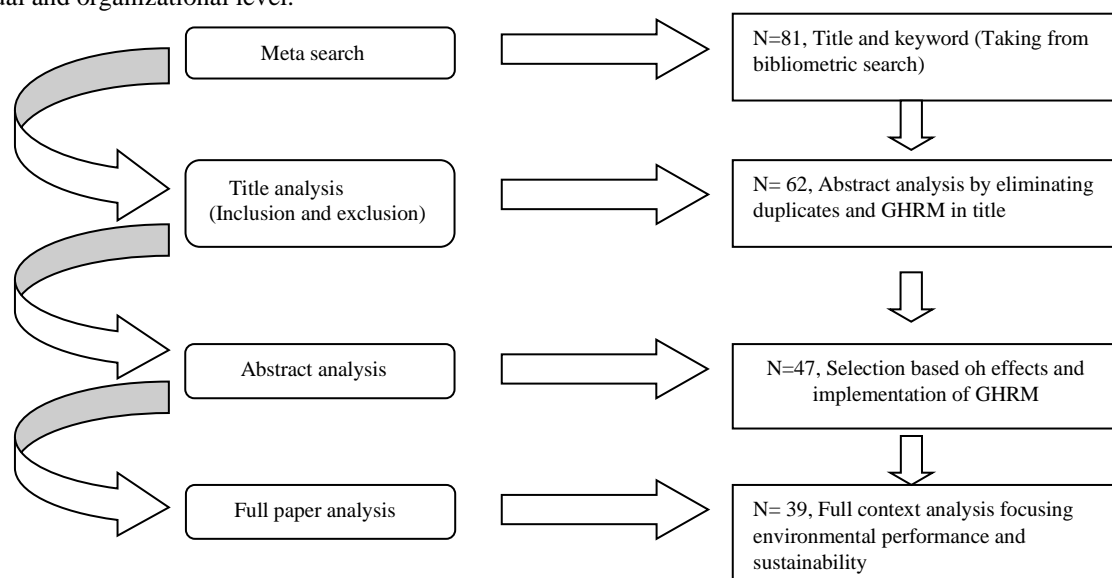
Fig 9. Systematic literature search by using PRISMA (Source: Created by Author)

After a careful review of the literature, it was discovered that empirical research and descriptive statistics were combined in every publication on the topic of GHRM. Survey methods using structured questionnaires have been widely used in single-wave and multi-wave investigations to obtain data. Additionally, a multi-source data collection technique has been included in several articles. (Muisyo et al., 2022). A fascinating variety of theories have been used; some studies have integrated many theories to explain the relationship between GHRM and other control variables.

Theories and approaches

The study assembles different theories that came out from in various emperical research to explain the concept of different studies relating GHRM. Some of the theories such as Social exchange theory, social identity theory, resource based theory, ability-motivation-opportunity theory, social cognitive theory, social learning theory, intellectual capital based view and theory of planned behaviour. Table 9 shows the adoption of theories by different authors in different year. Some documents contain more then on etheory to explain the construct and their relationship. Overall, for exploring and achieving organizational outcomes and performance of GHRM practices, AMO theory better fit to study with different dimentions. In order to improve and raise the likelihood that they will achieve a better green organisational performance, the AMO framework suggests that organisations give employees new skills, greater incentives, and more opportunities to adopt environmentally friendly behaviours and make a commitment to environmental sustainability on both an individual and organisational level (Benevene & Buonomo, 2020).

Table.9 Chararecterization of papers based on different theories

Theory	Adopted by different authors
Ability-Motivation-Opportunity	(Guerci & Carollo, 2016), (Muisyo & Qin, 2021), (Bhatti et al., 2022), (Muisyo et al., 2022), (Song et al., 2020)(Wen et al., 2022), (Roscoe et al., 2019), (Pham, Vo Thanh, et al., 2020),(Anwar et al., 2020), (Gholami et al., 2016), (Hameed et al., 2020)
Resource based view	(Cabral & Lochan Dhar, 2019), (Ren et al., 2020), (Abbas et al., 2022), (Yong, Yusliza, Ramayah, et al., 2020), (Gedam et al., 2023)
Social exchange theory	(Bhatti et al., 2022), (El Baroudi et al., 2023), (Paillé et al., 2020)
Social identity theory	(Kim et al., 2019a), (Lu et al., 2022), (Karatepe et al., 2022), (Parida et al., 2021), (Ali et al., 2022)
Resource based view	(Khatoon et al., 2022), (Abbas et al., 2022)
Intellectual capital- based view	(Ali et al., 2022)
Social cognitive theory	(Nisar et al., 2021)
Theory of planned behaviour	(Rubel et al., 2021a)
Social learning theory	(Tuan, 2022)

Source: Created by Author

Major findings elaborated

The entire review process took a lot of refinements to find out a precise framework of the body of GHRM. It is segmented and studied with several objectives and focus areas such as the effect and relationship between Ghrm and its

implementation pertaining environmental performance (Marrucci et al., 2021; Muisyo & Qin, 2021; (Kim et al., 2019b). It can be critically observed the similarities between the findings which focus on GHRM impacts on environmental performance (Muisyo & Qin, 2021)which includes major GHRM practices such as Green Recruitment and Selection, Green Performance Management and Reward, Green Trainings, Green Employee Involvement and Green Job Analysis. Howerver some study also identified barriers or paradox perceived by the organization for exploring environmental sustainability by HRM, it also found the key pracatices which are analyzed in different sectors and different geaographical area. To achieve competetive advantage and sustinbaility in the industrial sector, GHRM has been stuided which took green competencies into consideration such as green knowledge, geen skills, green abilities, green attitude, green behaviour and green awareness (Cabral & Lochan Dhar, 2019). As per as psychological factors are considered, some study reveals the effects and implemnetaion of GHRM in both oranizational and individual levels (Shafaei et al., 2020; Bhatti et al., 2022). Through GHRM ia a vast area, to find the exact relationship for implementation of the this mangement system is very complex (Shafaei et al., 2020). Therefore all the practices of GHRM are taken as factors or measures to study GHRM in different country in different sectors. Several studies found the positive and direct relationship between GHRM and various factors such as environmental performance, Employee job satisfaction, organizational performance, environmental sustainability, organizational citizenship behaviour and green supply chain managemnet (Longoni et al., 2018). Additionally, some empirical research explains the strong correlation between green organisation culture, pro-environmental HRM practices, and the interplay between employee dedication, eco-friendly behaviour, and environmental performance. (Ali et al., 2022). Corporate social responsibility and the green psychological climate in Iranian enterprises act as mediators between green human resource management and employees' green behaviour, influencing the latter both directly and indirectly.(Sabokro et al., 2021). In the study of human resource mangement researchers have focused all the practices of HRM to study the significant relationship between the environmnetal performance via GHRM practices. Taking a single practice of training and development some study has been made to achive the environmental and organizational performance very specific. Most of the articles adopt Partial Least Square methods for structural euation modeling to achive the emperical findings (Nejati et al., 2017; Yeşiltaş et al., 2022; Freitas et al., 2020; Nisar et al., 2021). Some articles also adopt AHP(Analytical Hirarchical Process) and fussy approach for multi criterial decision maing in the field of GHRM in different geographical region (Luthra et al., 2016; Sayyadi Tooranloo et al., 2017; Mojumder & Singh, 2021; Khatoon et al., 2022). Maximum no of emperical research has been conducted in different manufacturing and service sectors. Overall insight study suggest some scope for future research agenda and directions for moulding the research to achieve environmental as well as organizational sustainability.

Themes related to the concept of GHRM and findings in respective study

Finding related different themes	**Reflected in various works**
Most adopted practices of HRM (Green recruitment and selection, Green training and development, green performance and reward/compensation, green involvement and job design) taken as key measures for building relationship with other dimensions or control variables.	(Guerci & Carollo, 2016), (Muisyo & Qin, 2021), (Marrucci et al., 2021), (Bhatti et al., 2022), (Abbas et al., 2022), (Longoni et al., 2018) (Wen et al., 2022), (Yong, Yusliza, Ramayah, et al., 2020), (Pham, Vo Thanh, et al., 2020), (Mousa & Othman, 2020), (Gholami et al., 2016), (Khatoon et al., 2022)
Some studies shows the relationship between employee green behavior/ pro environmental behavior to undergo GHRM	(Nisar et al., 2021), (Karatepe et al., 2022), (Parida et al., 2021), (Rubel et al., 2021b), (El Baroudi et al., 2023), (Sabokro et al., 2021)
Organizational citizenship behavior for environment	(Muisyo et al., 2022), (Hameed et al., 2020), (Lu et al., 2022), (Paillé et al., 2014), (Anwar et al., 2020), (Tuan, 2022), (Pham, Vo Thanh, et al., 2020)
Green organizational culture endures green organizational performance fostering organizational sustainability and environmental performance.	(Rawashdeh, 2018), (Fernández et al., 2017), (Adjei-Bamfo et al., 2020), (Masri & Jaaron, 2017), (Shah et al., 2021), (Yeşiltaş et al., 2022), (Adjei-Bamfo et al., 2020)

Source: Developed by authors

Constructs derive for future study

However, above review process came out of various investigations which found different approaches theories and lot of theroritical and emperical evidence in exploring GHRM. GHRM is studied along with several variables and it also took certain measurement models to derive a relationship between GHRM and environmental performance. In most of the studies, GHRM is studied with taking all its practices such as Green hiring/green recruitment and selection, green training and development, green performance and reward management, green involvement and many more. But in few studies several concept and practices are negected and underrated. As researchers are moving towards finding a solution to reduce carbon footprint and environmental damages, they should go through the main motto to ensure environmental sustainability by measuring environmental performance both in individual level and organizational level. Hence, environmental performance must be taken care of both in individual as well as organizational level while studying GHRM for environmental sustainability. Another variables such as pro environmental behaviour, organizational support, organizational citizenship behaviour must be look after with GHRM function to derive relationship among them which can be more effective and justified for the policy makers and HR investigators.

Theoretical implications

The current study will assist in organizing the scattered literature in GHRM into specific and clear one. The study may help or make significant contribution to the policymakers and researchers by alying the general knowledge by providing an overview of new research trends in current field as well as classifying different methodology and theories for the purpose of assisting future studies in comprehending the cause- and –effect relationship between GHRM and sustainability. This research also examines the various terminalogies, theories and variables that affect the domain of GHRM and acertaining green practices. As a result, it will advance the body of knowledge regarding GHRM and serve as a solid foundation for further research.

Conclusion

This Bibliometric and meta review of Green HRM shows the signifcant interest in the field with the strategies of research frameworks for the research developemnt of GHRM. Based on the study and findings, it can be said that the year 2019, with 78 publications (29.66%), saw the greatest growing development of the GHRM sector throughout the previous ten years (2016–2021) in scopus. The Journal of Cleaner Production, with 31 doc publishes the majority of worldwide publications in the subject of GHRM. (Sandria & Wardhana, 2021). As per as dominating county is concerned, China produce maximum no of research worldwide in GHRM. Jabbour, C.J.C., Yusliza, M.Y., and Guerci, M. are the most cited and significant contributor in the current study. In addition, to this a statistical study Lotka's Law is used to determine the authors productivity in Green Human Resource Management (A et al., 2023). VOSviwer and biblioshiny software furnish the study by analysing and summarisng and representing different network maps and tables(Oladinrin et al., 2022; Sood et al., 2021; Yu et al., 2020). According to the results, there also so many themes that can be studied along with GHRM prcatices such as green creativity, green behaviour in workplace, compettive advantage, green intellectual capital and many more. Finally, it can be seen from above analysis and results along with meta review, the concept of GHRM is still emerging prevailing a lot of scope and future reserch directions.

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