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Development of Sustainable Human Resources in the Period 2000-2021: A Bibliometric Review

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ABSTRACT

The main purpose of this research is to make suggestions for future studies by making bibliometric analyses of publications, researchers, institutions, countries and their connections in sustainable human resources management between 2000-2021. It is bibliometric research in terms of research method, and the research data were obtained from the Web of Science (WoS) and Scopus database. We reviewed 505 articles published in 210 journals between 2000-2021 to collect data according to inclusion and exclusion criteria. We conducted performance and scientific field mapping analyses to reveal the field's overall view of the research. Analysis findings show that the interest in sustainable human resources management is increasing daily, and there is an increasing trend towards areas such as "green human resources management" and "corporate social responsibility". In addition, we determined that ten core journals on the sustainability of human resources dominate the field.

KEYWORDS

Sustainable human resource management; Bibliometric analysis; Visual mapping; Common citation analysis; Common word analysis

1 Introduction

The rapid depletion of natural resources in the world and the increasing environmental concerns for the future increase the importance of sustainability. Decreasing birth rates, aging population and epidemics increase the need for human resources with high productivity and creativity. Sustainable human resources is one of the most studied topics in recent literature. Approaches such as industry 4.0 and society 5.0 increase the interest in sustainable human resource management approaches (Sharma, Luthra, Joshi & Kumar, 2022; Mukhuty, Upadhyay & Rothwell, 2022; Hosseini, Moghaddam, Damganian & Shafiei Nikabadi, 2022; Cooke, Dickmann & Parry, 2022). This study aimed to see the trend in this field by analyzing the sustainable human resources management literature between 2000-2021 within the framework of bibliometric criteria.

Meeting unlimited human needs with scarce resources increases the importance of sustainability. The ability of organizations to continue their existence prioritizes the issue of sustainable human resources as all other resources. This development provides the emergence of many concepts such as sustainable management, sustainable business, sustainable education, sustainable marketing and sustainable human resources management (Mazur, 2017; Macke & Genari, 2019; Peterson, Minton, Liu & Bartholomew, 2021; Cavus, Sani, Haruna & Lawan, 2021; Borowiecki et al., 2022; Jevnaker &

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Olaisen, 2022). Another reason why the issue of sustainability has gained importance is that it is handled at the United Nations level. The “Sustainable Development Goals (SDGs),” which 170 countries came together at the United Nations (U.N.) in 2015, came into effect in 2016, and 17 basic sustainable goals were determined as the target to be achieved in 2030. Fight against poverty, fight hunger, health and quality life, quality education, gender equality, clean water and sanitation, accessible and clean energy, decent work and economic growth, industry innovation and infrastructure, reducing inequalities, sustainable cities and communities, responsible production and consumption, climate action, life in water, life on land, peace, justice and strong institutions, partnerships for ends. As can be seen, some of these goals are directly related to the issue of sustainable human resources, while others are directly related to the issue of sustainable human resources (UNDP, 2021).

Bibliometry is the mathematical and statistical analysis of scientific publications, researchers, citations, and common citations covering a certain period. Bibliometry is widely used as an important research technique in which scientific developments can be followed (Mcburney & Novak, 2002; Martinez et al., 2015). Bibliometric analysis is a research technique based on quantitative analysis and interpretation of data in all kinds of scientific publications and making various projections. In bibliometric research, web-based research is carried out in various sample sizes. Some of these cover a relatively small sample, while others cover a very large area (Osareh, 1996; Laengle et al., 2017). Bibliometric research is concerned with classifying, grouping and analyzing certain features of documents, publications, and indicators with any information content and presenting them in tables and graphs. In bibliometric analysis different analyzes such as citation analysis, bibliographic matching analysis, co-citation analysis, researcher analysis, institution analysis, bibliometric mapping analysis, indicator analysis and network analysis can be performed (Lluch et al., 2009; Rehn & Kronman, 2008). Bibliometric studies can be descriptive and evaluative (Mcburney & Novak, 2002). Although various methods have been developed to quantitatively identify scientific publications that have an important role in the development of science, one of the most widely used methods is the bibliometric analysis method.

Recently, the increase in accessing rich data from databases such as Web of Science (WoS) and Scopus increases the possibility of indexing web information, cataloging, accessing metadata and link visual analysis mapping. It increases the importance of bibliometric research as it allows one to see how the studied area has evolved and made suggestions based on factual data (Law & Cheung, 2008; Tang, Liao & Su, 2018). In bibliometric research, a process is followed to identify key concepts, research design, bibliometric data collection, data analysis, visualization and interpretation (Cobo et al., 2011; Zupic & Čater, 2015; Aria & Cuccurullo, 2017). In this research, we conducted a bibliometric analysis covering the period 2000 – 2021 to better understand the current structure of the sustainable human resources management (SHRM) literature, depending on the process in question.

Using bibliometric techniques to analyze publications' quantitative structure and scientific characteristics on specific topics guides future research. Bibliometric research is also very functional in seeing how the literature has evolved, identifying gaps, and heading new fields of study (Cobo et al., 2011; Zupic & Čater, 2015). Bibliometric studies are also very useful in giving clues about journals' publication policies (Xu, Yu & Wang, 2018). In this bibliometric study, we aimed to contribute to the literature by identifying productive authors, journals, institutions, universities and countries on Sustainable Human Resources (SHRM) and determining their performance through citation analysis and common citation analysis. For this purpose, we aimed to answer the following sub-questions in addition to the basic question of "What is the general view of the sustainable human resources literature in the research":

1. What is the outlook for SHRM-related publications over the years?

2. What is the conceptual change preference of publications in SHRM?

3. How is the publication performance of authors, countries and universities in SHRM?

4. What are citation and co-citation analyses of publications related to SHRM?
5. How is the network analysis of researchers at SHRM?
6. Do publications on SHRM comply with Bradford law?

2 Conceptual framework: sustainable human resource management

SHRM is defined as adopting HRM strategies and practices that control undesirable side-effects and negative feedback, enabling the achievement of financial, social and ecological goals with a long-term impact inside and outside the organization (Ehnert, Parsa, Roper, Wagner, & Muller-Camen, 2016; Piwowar-Sulej, 2021). In the historical process, personnel management, human resources management, strategic human resources management, and in recent years, the evolutionary process of human management under sustainable human resources management (SHRM) continues with different names. SHRM is an approach that prioritizes sustainability in recruitment, placement and development processes. Especially in recent years, the increasing awareness of social inequalities and environmental problems has increased the interest in sustainability and sustainable human resources management (Kramar, 2014; Özutku, Çetinkaya & Ağca, 2015; Esen, 2018).

The holistic approach, which adopts the development of human resources and sustainable economic growth based on natural resources for sustainable development, was adopted in 1992 in Rio de Janeiro, Brazil. At the United Nations Conference on Environment and Development (UNCED) held in Rio de Janeiro, countries decided on protecting the environment and the basic principles of sustainable development (Kaypak, 2011; Şahinöz, 2019). Considering the economy, environment and social dimensions together in ensuring sustainable development increases the interest in SHRM. The main problem area of sustainability is to leave a livable world for future generations by protecting natural resources and the environment (Kesen, 2016; Tariq, Jan, & Ahmad, 2016). The SHRM approach expresses a management approach that respects the right of future generations to live in a healthy environment and livable ecosystem.

As the importance of sustainability in responding to the expectations of the company's internal and external environment was understood, the importance of SHRM began to increase (Stankeviciute & Savaneviciene, 2018; Karman, 2020). The main purpose of SHRM is to carry firm profit, economic, and social concerns, as in strategic human resources management. Planned change is important in ensuring sustainability and is the primary goal in employee talent development. Sustainability-oriented leadership is important in achieving this goal (Inigo & Albareda, 2019; Yong, Yusliza, Ramayah, Chiappetta, Jabbour, Sehnem & Mani, 2020). Sustainable leadership understanding requires emotional intelligence, strong organizational values, an interesting vision, analytical and technical thinking, and a holistic perspective (Bryson, 2011; Senbel, 2015; Kesen, 2016). Another way to ensure sustainability is to be sensitive to the economy and the environment. In constantly changing social, economic and environmental conditions, organizational change is a reliable tool for organizations to survive (Huge et al., 2013; Dunphy, Griffiths & Benn, 2003). SHRM sees the training and development of human resources as the basis of sustainability (Aragón-Sánchez et al., 2003; Ehnert, 2006). One of the basic conditions of achieving organizational change is learning and talent development and seeing how human resources management evolves (Hong, 2020). Increasing concern about environmental problems, which has become a global problem today, forces businesses to develop a green management approach and SHRM.

Sustainable human resource management considers human management within the framework of the Triple Bottom Line. The Triple Bottom Line regards it necessary to consider the "ecological", "economic" and "social" dimensions together in order to ensure sustainability. Sustainability, ecological integrity, economic wealth and social equality are interrelated processes. Müller-Christ and Remer (1999) refer to the triple basic model as “the law of the ratio of resource production and resource use to

equal 1. The closer the resource use and resource production ratio get to 1, the more the sustainability of resources will increase (Boudreau & Ramstad, 2005). SHRM associates the need to respond to ecological, economic and social pressures with the development of human abilities (Dyllick & Hockerts, 2002; Stankeviciute & Savaneviciene, 2013). SHRM includes human resources strategies and all strategic actions capable of implementing them in the long term. SHRM considers it necessary to determine a long-term strategy to meet future needs (Grabara et al., 2020; Wagner, 2011). For SHRM, the main objective is to train human resources suitable for future businesses. Sustainable human resources management also aims not to harm the stakeholders of the company's activities in the end.

The "Brundtland Report" published by the United Nations has coded sustainability as "Our Common Future." By placing environmental issues on the political agenda, the Brundtland Report aimed to see the environment and development as a single issue. In the Brundtland Report, three primary targets were determined as “economical,” “social,” and “environmental” without compromising the natural environment and living conditions. Economic sustainability protects the environment and natural resources for future generations and economic development. Economic sustainability and sustainable human resources management require constant interaction. The goal of economic sustainability is to eliminate income inequality. It aims at social sustainability, a healthy environment and a high standard of living. On the other hand, environmental sustainability aims to eliminate environmental impacts that may prevent the creation of a safe and comfortable environment (Clark, 2013). Based on the statements here, it is understood that the United Nations' sustainability approach evaluates human resources management from a macro and micro perspective (Ehnert & Harry, 2012). The macro perspective considers sustainability together with economic and social sustainability. The micro perspective on sustainability considers sustainability only as sustainable human resources. The aging workforce and various occupational health problems are among the main issues of micro-sustainability (Barrena-Martinez et al., 2019; Ybema et al., 2020).

Businesses are economic, technical and especially social structures organized in an open system style that forces them to be sensitive to the environment. Developing innovative products and methods to protect the environment for businesses is a priority goal (Hosain & Rahman, 2016; Demir, Uslu & Kedikli, 2017). In this context, green human resources management is developing as a new human resources management approach that prioritizes the sustainability of the environment. Successful environmental management considers the sensitivity of human resources to the environment as a priority target. Green human resources management acts from the necessity of environmental management to be related to human resources management in every situation. Green human resources management (GHRM) acts with the awareness that the protection of the environment in the operational processes of enterprises is the primary duty of human resources management. GHRM is a management approach that considers it necessary to constantly consider environmental awareness and sustainability in the activities of businesses (Renwick et al., 2013; Kedikli, 2017; Wood & Budhwar, 2021).

GHRM considers protecting the environment in businesses and the natural environment in industrial activities as the basic condition of sustainability. GHRM is based on the combination of management, environmentally friendly organizational structure, industrial activity and environmentally sensitive marketing (Rani & Mishra, 2014; Hosain & Rahman, 2016). GHRM bases the policies and strategies of companies on protecting the environment. Unlike traditional human resources management, GHRM prioritizes flexible working hours, electronic offices, car sharing, teleconferencing, recycling, and remote working (Ahmad, 2015; Deshwal, 2015; Rezaei-Moghaddam, 2016). The main purpose of all these activities is to protect nature and sustainability at the firm level through lower waste, costs, and carbon emissions (Daily & Huang, 2001; Bangwal & Tiwari, 2015). Recently, companies have turned to green human resources management approach to respond to the demands of the environment to achieve corporate sustainability and competitive advantage (Dumont, Shen & Deng, 2017; Ren, Jiang & Tang, 2021).

3 Method

3.1 Research design

Bibliometric research is conducted to show the development of a particular subject or field and explore the conceptual and intellectual structure of a particular field in the literature (Donthu, Kumar, Pandey, & Lim, 2021). Bibliometric research is done to visualize the general view of the relevant literature and to show the performance of researchers, articles, journals, keywords and institutions. Bibliographic data is collected, processed, and analyzed quantitatively from publications on the subject examined in the bibliometric analysis. In these analyzes, in addition to general descriptive statistics, sophisticated analyzes such as citation analyses, co-citation analyses, keyword networks and collaboration networks are used (Zupic & Cater, 2015; Liu et al., 2015). However, the bibliometric method differs from the literature review because it focuses on evaluating the structure of a particular research area and allows seeing how the publications show a trend in the period under review (Block & Fisch, 2020). The bibliometric method is also preferred because it is convenient to see the development, conceptual/intellectual structure, and research results in a certain period (Cobo et al., 2011).

3.2 Data collection

Bibliometric data is usually obtained from databases searched according to inclusion and exclusion criteria (Block & Fisch, 2020). This study collected bibliometric data of publications on SHRM by scanning WoS and Scopus databases (Table 1). We conducted a topic query with all possible nomenclature forms to include sustainable human resource management articles. We preferred WoS and Scopus databases because they contain sufficient data for bibliometric analyses in social sciences. Another reason for choosing these two databases is that they contain the appropriate file type (Cobo et al., 2011; Zupic & Cater, 2015). These advantages provide significant convenience in obtaining data, transferring them to the program and performing analysis. We used the inclusion and exclusion criteria shown in Table 2 to exclude conference texts, books, and book chapters that were not considered validated information in the research (Block & Fish, 2020).

3.3 Bibliometric analysis of data

In bibliometric studies, classification, visualization, similarity matrices and relationships between items are usually calculated. In bibliometric research, different analyzes such as overview analysis, researcher analysis, article analysis, conceptual structure analysis, intellectual structure analysis and network structure analysis can be performed (Moral-Muñoz et al., 2020; Zupic & Čater, 2015). In this study, we used BibExcel, Bibliometrix and VOSviewer for these analyses. We presented images of relationships and similarities during the visualization process (Aria & Cuccurullo, 2017; Van Eck & Waltman, 2010). We performed network analyses to determine the number of clusters in the data visualization, the number of co-occurrences, the relationships among the various units of analysis, and the number of citations. We performed statistical analysis on the maps created to indicate different metrics of the entire network (Low & Siegel, 2019; Aria & Cuccurullo, 2017). In the conceptual structure analysis, we first identified the keywords and then scanned the keywords, and in the last stage, we analyzed the bibliographic data obtained from the WoS and Scopus database (Ruhanen et al., 2015; Fahimnia et al., 2015). We have shown how prolific researchers who have contributed to intellectual structure analysis have influenced the scientific community. We tried to reveal different perspectives that developed over time with the intellectual structure analysis obtained from attribution and co-citation analysis (Cobo et al., 2011; Mendes et al., 2017). With network analysis, we examined research

topics, authors and relations between institutions in a specific field and made various comments by identifying information connections (Scott, 2000). We tried to show the interaction between authors and institutions through network analysis.

We performed a performance analysis that provides a descriptive overview of the SHRM field in the research. In data analysis; The most published journals on sustainable human resource management, the most studied concepts, the publication performance of authors, countries and universities, the most cited articles, the citation analysis and co-citation analysis of publications, the social network analysis of researchers, and finally the analysis of publications' compliance with Bradford's law (Barringer et al., 2005; Higuchi, 2016). In the research, the Social Sciences Citation Index (SSCI), Science Citation Index Expanded (SCI-Expanded), Arts and Humanities Citation Index (A&HCI) and Emerging Sources Citation Index (ESCI) in Web of Science (WoS) and Scopus database between 2000-2021. We reviewed 505 scanned articles. We used VOSviewer software, a clustering-based network inference algorithm and a bibliometrix (R-tool) program for analysis (Block & Fisch, 2020; Van Eck & Waltman, 2009).

Table 1 Keywords and bibliographic databases

Keywords:	Bibliographic Databases		Total
	WoS	Scopus	
"Sustainable Human Resource" OR "Sustainable Human Resource Management" OR "Sustainable Human Resource Practice" OR "Sustainable Human Resource Development" OR "Sustainable Human Resource Management Strategy" OR "Sustainable Human Resource Management Approach" OR "Sustainable Human Resource Management Perspectives" OR "Human Resource Management and Sustainability"	325	485	810

After identifying appropriate databases, we searched for relevant publications using the keywords and Boolean operators shown in Table 1. In order to ensure that all articles adequately representative of the field of sustainable human resource management during the period under review are included, we conducted a topic inquiry with possible naming forms related to the theory. Because of scanning the relevant keywords in Table 1 in the title, abstract or keywords, we identified 810 studies between 2000 and 2021. Then, we performed the filtering processes for 810 studies. We used the inclusion and exclusion criteria given in Table 2.

Table 2 Inclusion and exclusion criteria

Inclusion criteria	Exclusion criteria
Articles, research and review articles in business management, keywords, and English-language articles.	Book, book chapters and conference proceedings.

We included only publications in the field of human resource management and articles in English in the analysis. We excluded conference proceedings and book chapters that are not based on empirical information, as they are not peer-reviewed, the quality of the information may vary, and they are in the gray literature. In the title, abstract or keywords of the articles, we did not include articles that do not contain keywords related to sustainability and sustainable human resource management. We then excluded articles (276 articles) that were duplicated in WoS and Scopus. After all the filtering processes, in order to ensure that the selected articles are within the scope of SHRM, the titles, abstracts and keywords of 534 articles were re-evaluated, and 29 articles were excluded from the analysis because they were not within the scope of the research, and 505 articles were analyzed over bibliometric indicators.

4 Results

4.1 Descriptive analysis

Descriptive analysis, diagnostic analysis, predictive analysis and some prescriptive analysis transform raw data into usable information. This research summarized and visualized the data obtained from the databases during the descriptive analysis process. In the diagnostic analysis, we answered the research questions with the findings we obtained from the data. We tried to explore the relationships between the variables. We made projections for the future with predictive analyzes. We tried to predict the possible outcomes based on the findings from the data.

4.1.1 View of SHRM-related publications over the years

The productivity level of publications on SHRM by years followed a horizontal course in the first eight years and showed a rapid increase in 2009. This period was the 2008 world economic crisis, layoffs and employment problems. After 2016, a rapid upward trend was achieved. 382 of the 505 publications and 75% of the total publications were made five years after 2016.

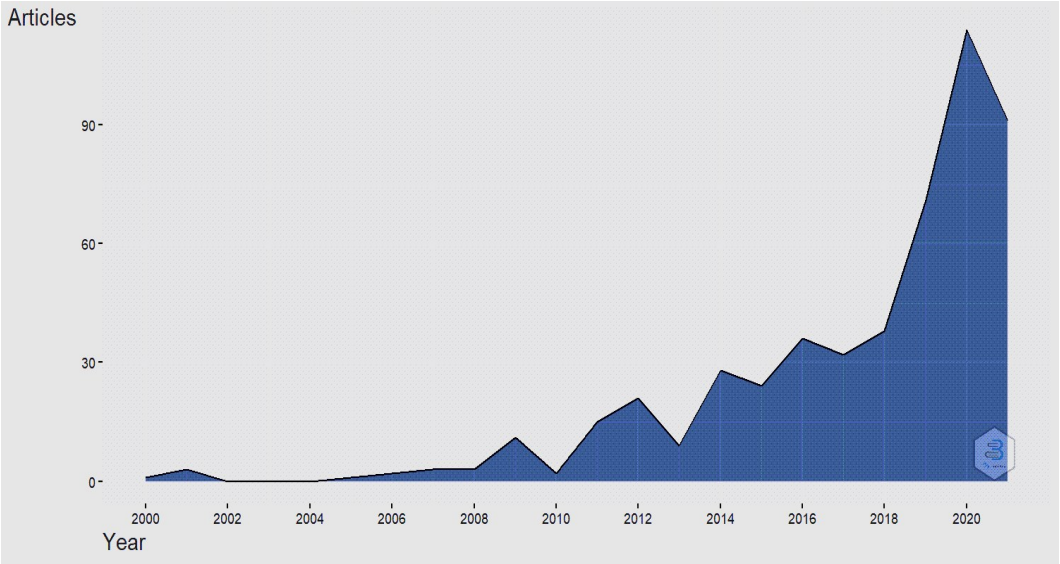

Figure 1 Annual scientific production in the SHRM field

The journal that published the highest number of articles in the analyzed period was sustainability (Table 3). During this period, 50 articles were published in the journal. The International Journal of Human Resource Management is the most-cited journal, with 1399 citations examined. The second most-cited journal is the Journal of Human Resource Management, and the journal's total number of citations in this period is 396. The top four most productive journals account for approximately 22% of the total publications and 17% of citations. The purpose and scope of the most productive journals, the International Journal of Human Resource Management and the Human Resource Management Review, is directly related to human resources management. In contrast, the most productive journal, Sustainability, is a journal that publishes directly with the environment. This situation has been evaluated as indicating that the field is suitable for interdisciplinary studies.

Table 3 The most productive journals

Sources	Articles	Total citations
Sustainability	50	377
International Journal of Human Resource Management	24	1399
Corporate Social Responsibility and Environmental Management	21	383
Human Resource Management Review	15	225
International Journal of Manpower	12	181
Journal of Business Ethics	12	385
Business Strategy and The Environment	10	214
Journal of Cleaner Production	10	335
Asia-Pacific Journal of Business Administration	9	105
Benchmarking-An International Journal	9	166
Management Revue	9	300
European Journal of Training and Development	6	91
Human Resource Management	6	396
International Journal of Productivity and Performance Management	6	35
Personnel Review	6	112
Zeitschrift Fur Personal Forschung	6	321
Asia Pacific Journal of Human Resources	5	194
Entrepreneurship and Sustainability issue	5	18
Journal of Global Responsibility	5	45
Journal of Organizational Effectiveness-People and Performance	5	77

4.1.2 Conceptual change preference of publications in SHRM

Figure 2 below shows the most frequently used keywords among 1491 in 505 articles. The red areas in the figure show the most frequently used words, the yellow areas show the less used words, and the green and blue areas show the least used words. The size of the letters also indicates the frequency of use of the words. The most frequently used keyword is green human resource management, with 45 repetitions. This is followed by the concept of corporate social responsibility with 38 words and the concept of sustainable development with 29 words. The most frequently used key concept is "green human resources management," which indicates the increased sensitivity in this area in recent years.

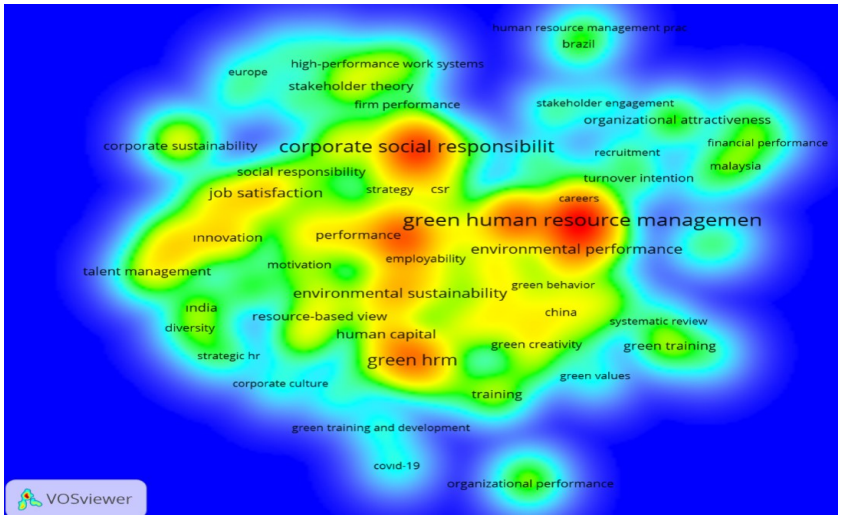

Figure 2 Most frequently used keywords in the sustainable human resource management field

Note: Created by using BibExcel and VOSviewer based on a sample of N = 505 articles.

When we look at the network map of the key concepts, it is seen that the concepts that are frequently used concerning the concept of green human resources management are "green creativity", "green education", "environmental performance", "stakeholder theory", "competitive advantage" and "sustainable development". We found that the concept of sustainable development is frequently used together with "innovation", "social responsibility", "green human resources management" and "strategic human resources management". We have determined that the concept of corporate social responsibility works together with the concepts of "human capital", "talent management", "organizational attractiveness" and "environment and social responsibility".

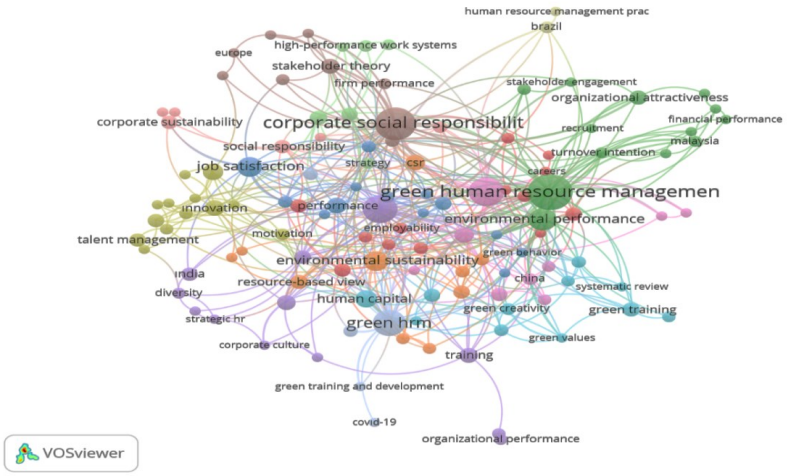

Figure 3 Relationship networks and total link strengths of the keywords

According to the research findings, while researchers focused on traditional concepts such as "leadership", "organizational culture", "motivation" and "HRM education" in the past years, in recent years, "green creativity", "green value", "environmental behavior" and it is understood that they focus on current issues such as "green management". This situation also represents a focus shift in HRM. In addition, research findings show that researchers have recently turned to social and environmental issues such as "social responsibility" and "social sensitivity".

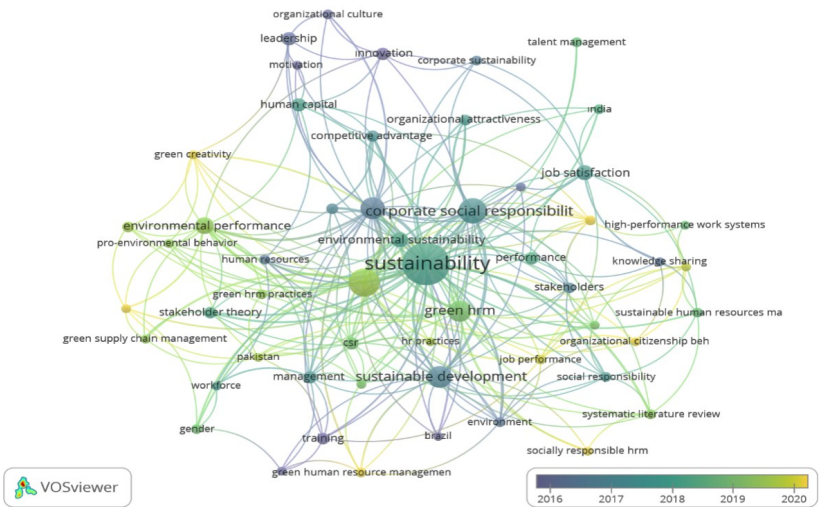

Figure 4 Status of the most frequently used keywords in the last five years

4.1.3 Publication performances of authors, countries and universities in SHRM

1121 authors contributed to the 505 articles that made up the sample. Table 4 shows the authors who contributed to two or more articles. Jabbour, C.J.C. is the most prolific author in terms of publication count, with 19 articles. Mariappanadar follows this author with ten articles and S. Ehnert I with nine articles.

Table 4 The most prolific authors

Authors	Articles	Total citations
Jabbour CJC	19	416
Mariappanadar S	10	188
Ehnert I	9	335
Chaudhary R	8	98
Muller-Camen M	8	356
Romero-Fernandez PM	8	61
Guerci M	7	125
Lopez-Fernandez M	7	81
Aust I	6	50
Jackson SE	6	264
Stankeviciute Z	6	35
Yusliza MY	6	61
Diaz-Cariion R	5	36
Lopez-Cabrales A	5	41
Peters P	5	19
Savaneviciene A	5	32
Wagner M	5	193
Afum E	4	48
Agyabeng-Mensah Y	4	48
Kramar R	4	267

Researchers working at 639 different universities produced the 505 articles examined. Of these universities, 415 contributed only one study to the field. Table 5 shows the most productive universities that have contributed five or more articles to sustainable human resource management by the number of articles. Australian Catholic University 15, Montpellier Business School 14, and University Cadiz are the universities that contributed the most to the field with nine articles. When universities are evaluated in citation performance, the University of Sao Paulo has the most citations, with 606 citations.

Table 5 Most productive universities

Affiliations	Articles	Total citations
Australian Catholic University	15	414
Montpellier Business School	14	239
University Cadiz	9	82
University Sao Paulo	9	606
University Milan	8	271
Appalachian State University	7	27
Dalian Maritime University	7	48
Indian Institute Technology Patna	7	50
Kaunas University Technology	7	38
Radboud University Nijmegen	7	105
Bucharest University Econ Studies	6	36
Macquarie University	6	57
Middlesex University	6	201
Rutgers State University	6	751

Table 5 Most productive universities(Continued).

Affiliations	Articles	Total citations
University Bremen	6	46
University Fed Santa Maria	6	29
University Leeds	6	182
University Malaysia Terengganu	6	185
University Sains Malaysia	6	136
Antwerp Management School	5	108

Researchers from 55 different countries wrote the 505 articles included in the analysis. Table 6 shows the most productive countries contributing to sustainable human resource management through several articles and citations. The most active countries are the United States, with 46 articles and the highest number of citations; China, with 45 articles; Australia, with 42 articles and England, with 38 articles. India follows these with 33 articles and Spain with 30 articles. Approximately 47% (234 articles) of 505 articles were produced by researchers from the first six countries from 55 countries contributing to the field. These figures are important as they show that economic development is not independent of scientific progress.

Table 6 Most productive countries

Country	Number of Articles	Ratio (%)	Total Citations	Average Article Citations
USA	46	9	2648	57,57
China	45	9	1149	27,36
Australia	42	8	940	24,74
United Kingdom	38	8	822	18,27
India	33	7	623	56,64
Spain	30	6	613	20,43
Germany	23	5	573	28,65
Brazil	20	4	521	22,65
Italy	19	4	462	24,32
Malaysia	19	4	388	11,76
Poland	14	3	333	17,53
Netherlands	12	2	293	32,56
Belgium	11	2	188	17,09
France	11	2	178	89
Korea	11	2	140	11,67
Pakistan	9	2	135	27
Lithuania	8	2	89	14,83
Slovakia	8	2	79	11,29
Iran	7	1	79	19,75
Portugal	7	1	69	8,62

4.1.4 Citation analysis and co-citation analysis of SHRM-related publications

4.1.4.1 Citation analysis

Citation analysis is one of the most important parts of bibliometric assessments, and the more citations research gets, the more effective it is. Citation analyses are based on the assumption that authors cite important articles and, in a way, indicate the quality of the cited publication (Rodriguez-Ruiz et al., 2019; Ruggeri et al., 2019). However, considering the number of citations as a quality measure may give erroneous results. Newly published studies are expected to receive fewer citations than previously published articles not related to their quality. Accumulating citations can take time, so new citations may not be directly linked. This study determined the minimum number of citations for a cited reference as the threshold value of “25” for an article included in the citation analysis. Figure 5

shows the most influential Web of Science and Scopus citation publications. Accordingly, Daily, B.F's article "Achieving Sustainability Through Attention To Human Resource Factors in Environmental Management" is the most cited work with 460 citations. The most effective study, with 460 citations, is how many businesses associate the effectiveness of the environmental management system, which they use as a strategic tool in gaining competitive advantage, with human resources factors such as environmental education, employee empowerment, and teamwork and reward systems. Another major study is the article “An aspirational Framework for Strategic Human Resource Management” by Jackson, S. E. Pointing to the necessity of investigating important issues such as innovation management and environmental sustainability in developing the empirical knowledge base of Strategic Human Resources Management, this study is the second most cited study with 373 citations.

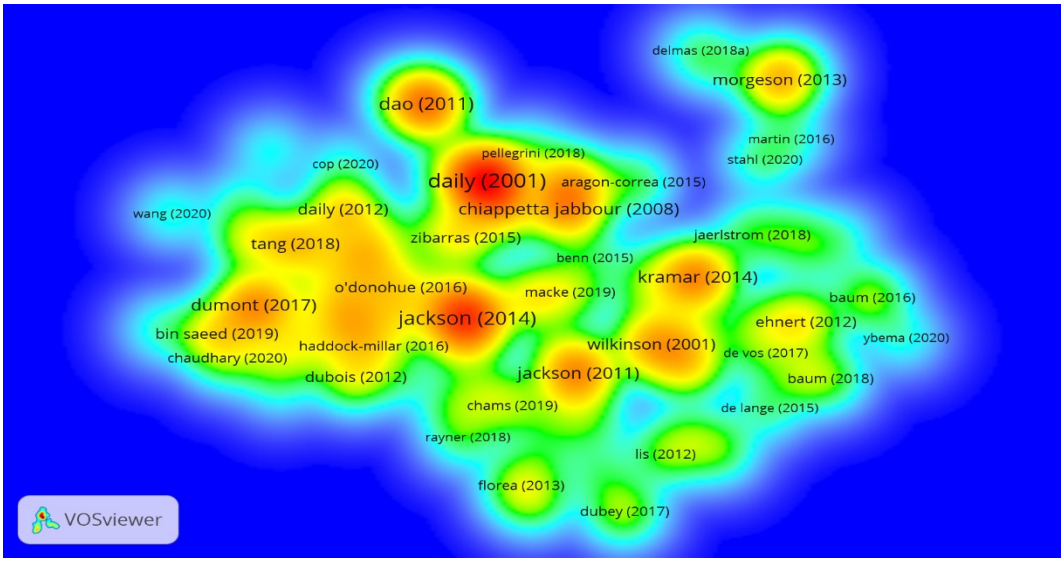

Figure 5 Most influential studies in the sustainable human resources management field.

Note: Created using VOSviewer based on a sample of N= 505 articles.

4.1.4.2 Co-Citation Analysis

We performed content similarities to measure content similarities between articles, authors, and journals in the research. We looked at the frequency of citations of publications with medium citation analyses or the frequency of citations of two different units of analysis (study, author, and journal) together in the same study. The more two studies are cited in co-citation analysis, the more accepted content similarities (Zupic & Čater, 2015). In addition, the appearance of a cited article in the reference section of another article indicates the relationship between the two publications. Common citation frequency indicates that a group of articles addresses a common theme (Liu et al., 2013; Egghe & Rousseau, 1990). We analyzed the common citations of 505 articles from Web of Science and Scopus databases and determined the content similarities between the articles at the publication and journal levels.

4.1.4.3 Publication-level co-citation analysis

In the research, we set the minimum threshold value as 20 citations to perform co-citation analysis, and we found that 117 articles met this criterion. In Figure 6, the size of the circles indicates the total citation frequency of the studies, while the density of the lines between the circles indicates how many citations were made to the two studies together. In addition, the circle near the center represents a central and influential position in the citation network, while the circle at the periphery represents a less influential position. 4218 joint references were made to 117 articles that passed the threshold.

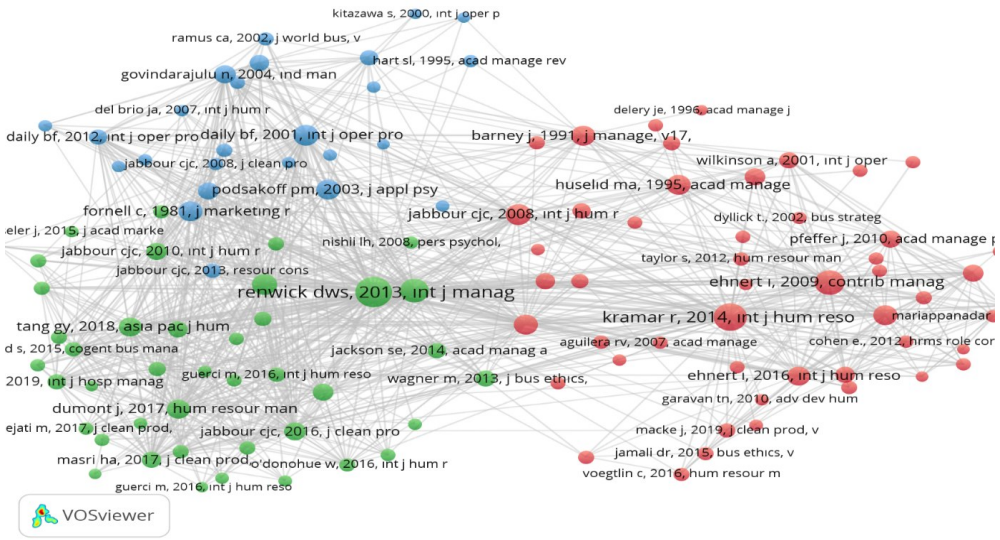

Figure 6 Co-citation analysis at the publication level

Results of co-citation analysis, Renwick D. W. S. (2013) 153 citations, Kramar R. (2014) 120 citations, and Ehnert I. (2009) 102 citations are the most co-cited works and occupy a central position in the citation network. It can be said that studies related to this aspect have shaped the sustainable human resources management literature.

4.1.4.4 Journal-level co-citation analysis

In the joint citation analysis performed at the journal level, we determined the minimum threshold value as 50 citations. Out of 210 journals with 20002 co-citations, 113 journals meet this criterion. The network visualization of the journal-level co-citation analysis is shown in Figure 7. The increase in citations from published articles is also related to the increase in Internet usage opportunities, the abundance of metadata and the increase in information literacy (Figuerola et al., 2017; Meho & Yang, 2007). One way to measure the quality and impact of journal articles is to use a rich collection of bibliometric indicators, such as citations, as a key reliable indicator (Harnad, 2008). However, the citation has several limitations, such as the time it takes to cite an article (Mas-Bleda et al., 2014).

The *International Journal of Human Resource Management* is the most-cited journal, with 1149 citations. Other journals with more than 1000 citations are the *Journal of Business Ethics* (1275 citations), the *Journal of Cleaner Production* (1231 citations), and the *Journal of Cleaner Production* (1231 citations).

Table 7 Most-cited journals

Top 20 journals	Number of citations
The International Journal of Human Resource Management	1449
Journal of Business Ethics	1275
Journal of Cleaner Production	1231
Academy of Management Journal	944
Academy of Management Review	707
Journal of Management	627
Journal of Applied Psychology	562
Human Resource Management-Us	450
Sustainability	413
Human Resource Management Review	359

Table 7 Most-cited journals(Continued).

Top 20 journals	Number of citations
Corporate Social Responsibility and Environmental Management	345
Journal of Organizational Behavior	340
Business Strategy and the Environment	335
International Journal of Operations & Production Management	334
Strategic Management Journal	333
International Journal of Production Economics	297
International Journal of Management Reviews	281
Personnel Psychology	256
Journal of Management Studies	248
Human Resource Management Journal	237

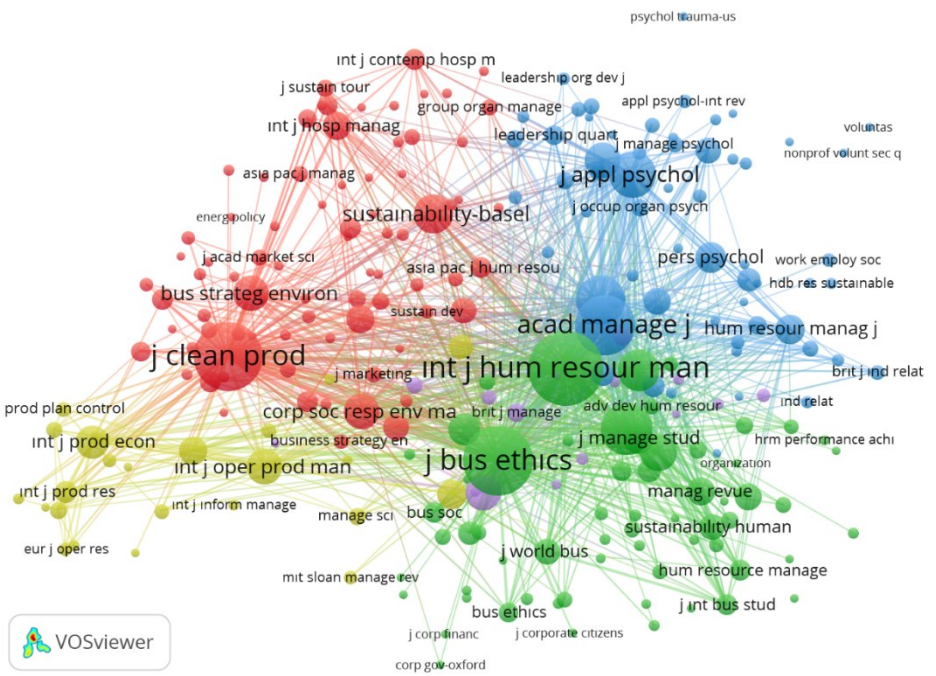

Figure 7 Co-citation analysis at the journal level

4.1.5 Network analysis by researchers at SHRM

Social network analysis is useful for studying research topics, authors, and inter-institutional relationships in a particular field and identifying and interpreting knowledge connections. Social network analysis aims to make inferences and produce information about an individual or a group in the network by examining the structure of a social network with various statistical methods. A social network is a structure that shows the interaction between researchers or institutions. Social network analysis focuses on the relationships and connections of each forming a community with other individuals (Hanneman & Riddle, 2005; Scott, 2000). Social network analysis, an effective tool for examining networks and the structures that make up the network, is also useful for bibliometric studies. Social network analysis consists of actors and relationships that connect actors to social structure. The co-author analysis in this context gives the image of social networks that emerged from collaborations between authors, institutions and countries.

In the mapping process in Figure 8, representing the co-authorship analysis by country, the lowest

document threshold per country was set to five. 37 out of 55 countries were included in the analysis, exceeding the threshold value. In the visualization performed with document weighting, 37 countries were represented in four clusters with different colors. In this context, the United Kingdom (62 documents, blue nodes), China (60 documents, green nodes) and the United States (58 documents, red nodes) are seeking greater cooperation networks and deeper ties with other countries in terms of research on sustainable human resource management. France (yellow node) has the lowest link diversity with other countries. According to the results of the co-authorship analysis at the country level, it is seen that the intense lost relations are realized in the blue cluster, which represents the European countries under the leadership of England.

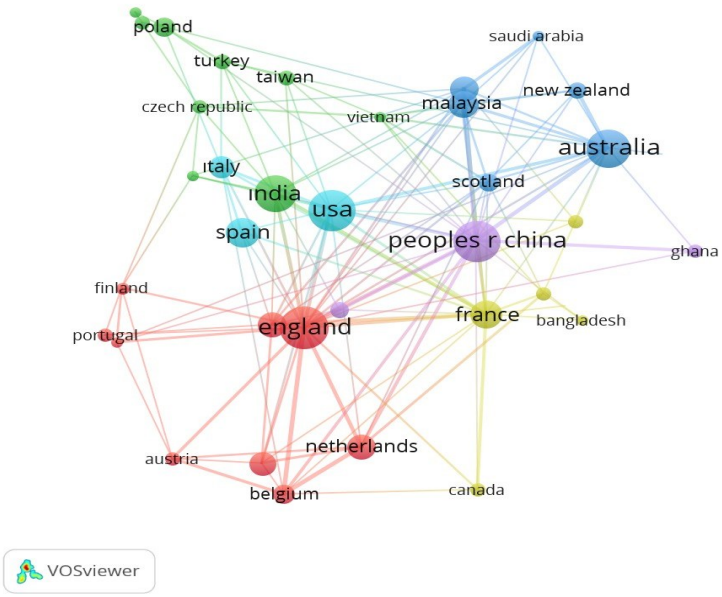

Figure 8 Co-authorship by country

In the mapping process in Figure 8, representing the co-authorship analysis by country, the lowest document threshold per country was set to five. 37 out of 55 countries were included in the analysis, exceeding the threshold value. In the visualization performed with document weighting, 37 countries were represented in four clusters with different colors. In this context, the United Kingdom (62 documents, blue nodes), China (60 documents, green nodes) and the United States (58 documents, red nodes) are seeking greater cooperation networks and deeper ties with other countries in terms of research on sustainable human resource management. France (yellow node) has the lowest link diversity with other countries. According to the results of the co-authorship analysis at the country level, it is seen that the intense lost relations are realized in the blue cluster, which represents the European countries under the leadership of England.

The threshold value in the mapping process of the co-authorship analysis according to the institutions was determined as five. 38 out of 639 universities were included in the analysis by exceeding the threshold value (Figure 10). In the visualization performed with document weighting, 38 universities are shown in different colors in six clusters. Australian Catholic University (10 posts, yellow node), University of Sao Paulo (10 posts, light blue node), Montpellier Business School (9 posts, blue nodes), Swinburne University Technology (6 posts, green node), Nottingham Trent University (4 publication, purple node) and Macquarie University (3 publications, red node) stand out as universities with more collaborative networks in terms of research on SHRM.

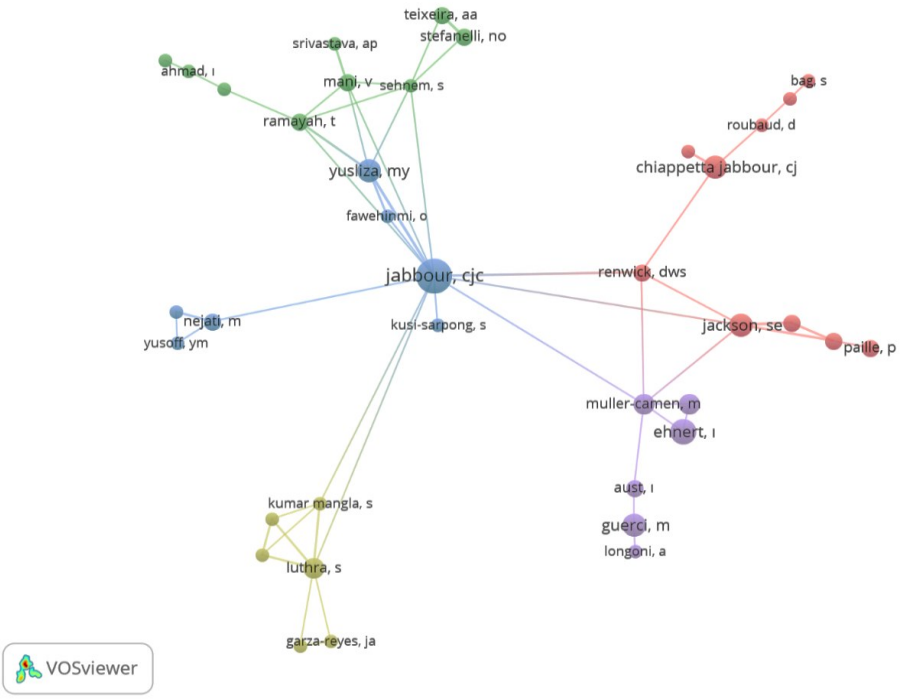

Figure 9 Co-authorship by author

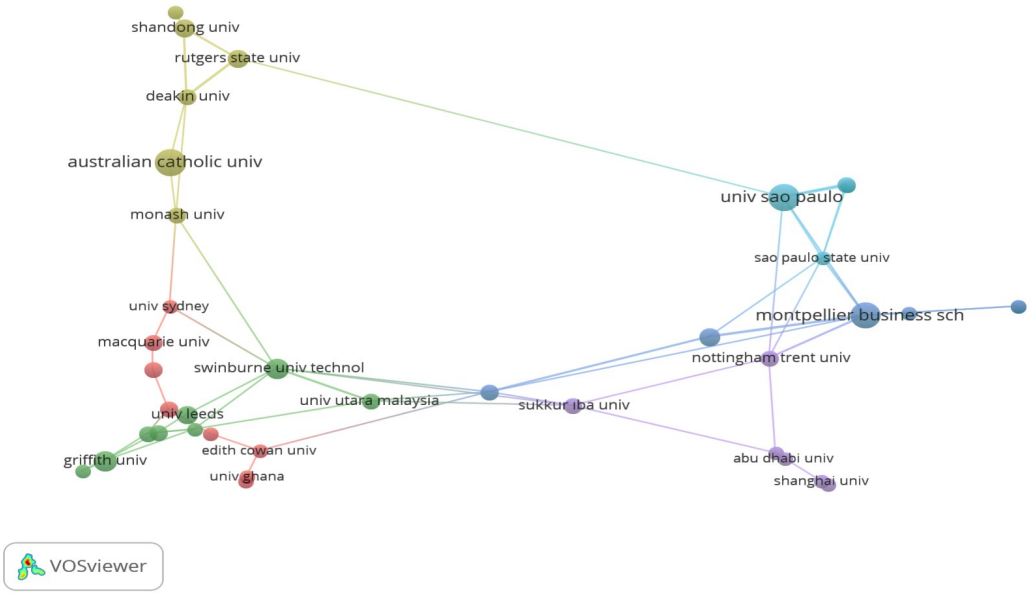

Figure 10 Co-authorship by organization

4.1.6 SHRM Related Publications Comply with Bradford Law

Bradford's Law of Scattering shows the distribution of the literature on a particular subject in journals (Bradford, 1934). According to Bradford's Law, the number of journals in each group should be proportional to $1:n:n^2$. The law stipulates that the number of journals in the second and third regions

will be n and n² times, respectively, than in the first region. Bradford law journals in a particular field; the core journal group with few journals (1/3), the second region group with more journals, and the third region group with bulk journals (Egghe & Rousseau, 1990; Garfield, 1980). In this study, 174 of the 505 articles included in the analysis were published in 10 journals (core journals) in the first field. The second region contains 50 journals (166 articles), while the third region contains 150 journals (165 articles) (Table 8).

Table 8 Distribution of journals based on Bradford's Law

Zone	Number of journals	Number of articles	Journal Percentage (%)
1	10	174	4.8
2	50	166	23.8
3	150	165	71.4
Total	210	505	100

The total number of citations in the articles included in the analysis is 11085. 4612 of the total citations were made to the most referenced core journals in the first region. In the core journal group, most of the citations from 505 articles were made to the journals *Sustainability*, the *International Journal of Human Resource Management* and *Corporate Social Responsibility and Environmental Management.*

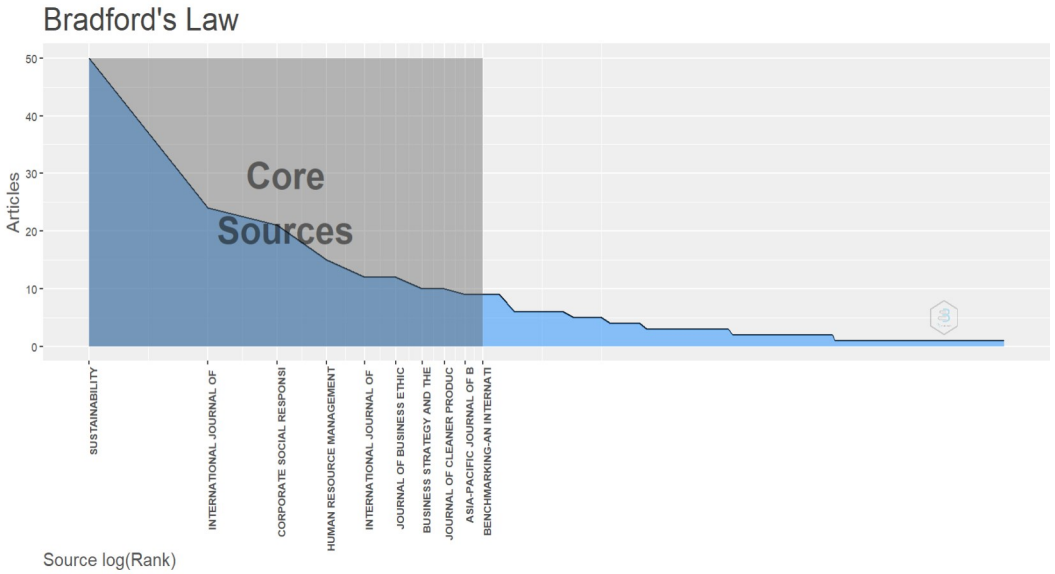

Figure 11 Source clustering through Bradford's Law.

Notes: Created using Bibliometrix based on a sample of N = 505 articles.

The distribution of journals and citations appears to align with Bradford's Law. For this reason, it can be said that a core journal group that directs the field can be taken as a reference. The core journal group in Figure 11 provides important clues in following the developments and gaps in the literature on sustainable human resources management research.

5 Discussion and conclusion

In this research, we examined the publications covering 1991-2021 to determine the general view of sustainable human resources management (SHRM) and the trend in this field. For this purpose, we conducted visual mapping and bibliometric analyses to determine the key concepts in sustainable

human resources management and the publication performance of countries, universities, and researchers. We revealed the conceptual, intellectual and network structure of the subject examined in the research. Because of the increasing environmental awareness, we have determined that the publications on sustainable human resources management have steadily increased in recent years. Considering the conceptual and intellectual structure of the study, we found that the field's interest is increasing daily. Findings show a gradual increase in publications on SHRM in the first years and a rapid increase in 2010-2012. These are the years when policy efforts to recover after the 2008 global financial crisis were undertaken. It can be deduced that the previous recovery efforts positively affected the development of scientific literature. This situation can also be interpreted as pointing to the unity of theory and practice. It is stated that the main scientific studies on SHRM come from developed and rapidly developing countries such as the USA (46), China (45), Australia (42), United Kingdom (38), India (33), Spain (30), Germany (23). It is important to show that economic development is not independent of scientific progress.

Using a rich collection, the way to measure the quality and impact of journals and their articles is to extract introductory/exploratory information from the past to the present. Bibliometric analysis is a practical method (Harnad, 2008: 103). This research is a roadmap for researchers to show existing knowledge on SHRM's conceptual, intellectual, and network structure. In addition, visual mapping of authors, citations, sources and countries' performances is important in showing the current knowledge and gap in the literature. The research's conceptual, intellectual, and network analyses will provide the opportunity to see the thematic development of the SHRM field with future research on the subject. We think this research will contribute to the advancement of SHRM by showing the gaps in sustainable human resource management and the current interest.

The research results show that studies on sustainable human resources are increasing daily. Increasing internet, meta-data and information literacy can affect broadcast performance. It can be argued that current hot topics (such as metadata, information literacy and information search) that emerge over time contribute to the increase in the number of research (Figuerola et al., 2017; Milojevi et al., 2011). One of the important reasons for the increase in broadcasting performance is that as societies' education and awareness levels increase, their sensitivity toward the environment increases. Another reason for the increasing interest in sustainable human resources management is the necessity of associating business with the concept of "sustainable development," which has been emphasized in economics in recent years. Although there are searches in the form of metaphorical neology in human resources management from time to time, sustainability in human resources management should not be considered as metaphorical neology as it has a concrete counterpart. Another reason for the increasing interest in sustainable human resources management is the number of non-governmental organizations operating on environmental protection.

Not all articles published on SHRM could be included in this study because they did not meet certain criteria. This research is a descriptive bibliometric study covering the WoS and Scopus databases. Other databases such as EBSCO and Google Scholar, Microsoft Academic, Crossref, Dimensions and CiteSeerX can also be used (Vieira and Gomes, 2009; Mongeon and Paul-Hus, 2016). Further research can be done by changing the keywords' inclusion and exclusion criteria. In addition, researchers can do meta-analyses in the future.

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Conflict of Interest

The authors declare that there are no conflicts of interest.

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