

Review

Science Mapping the Knowledge Base on Sustainable Human Resource Management, 1982–2019

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Received: 7 June 2019; Accepted: 12 July 2019; Published: 19 July 2019



Abstract: The increasing interest in sustainability has led to the emergence of a new research focus in the field of human resource management (HRM). HRM scholars have recently begun to explore how HRM might contribute to sustainable outcomes and coined the term ‘sustainable human resource management’ (S-HRM). In this bibliometric review, science mapping tools were used to examine 475 Scopus-indexed documents on S-HRM. The objectives of the review were to analyze the size, evolution, and regional distribution of this knowledge base, identify key journals, documents, as well as authors, examine the intellectual structure of this literature, and highlight topical trends. The review revealed a knowledge base that is still in the emergent phase, with a global scope but a concentration in Western developed societies. Four Schools of Thought emerged within this field. This review hopes to guide a new generation of S-HRM scholars by providing an overview of the current status of the knowledge base.

Keywords: sustainable human resource management; green human resource management; science mapping; bibliometric review; sustainability; management

1. Introduction

Traditionally, the literature on “strategic human resource management” viewed the term ‘strategic’ as equivalent to supporting a firm in achieving ‘economic performance’. The implicit focus was put on effectiveness and the economic value added by human resource (HR) activities to firm performance [1]. Often, this included a short-term view of profitability. Indeed, this perspective also extended to the assessment of the ‘effectiveness’ of managers and corporate leaders, which was frequently based on economic performance measures.

More recently, with the increased interest in sustainability, the idea of extending the focus from a purely economic one to include ecological and social responsibility gained traction. The so called ‘triple bottom line’ [2] introduced a broader perspective on how firms create value. This was accompanied by a change in focus from short-term profitability to longer-term success based on multiple indicators. In the human resource management (HRM) literature, this shift in perspective led to the emergence of a new research focus on ‘sustainable human resource management’ or S-HRM. Within the broad field of HRM, a variety of conceptualizations have been introduced including both green HRM which focuses on ecological aspects, to S-HRM which implies a broader focus on sustainable outcomes of the firm. The emerging field of S-HRM also incorporates both macro perspectives on how HRM contributes to sustainable outcomes as well as meso and micro perspectives on how to make HRM itself more sustainable.

Although the field has received more attention very recently, it is still in the emergent phase. Research reviews authored by Ehnert and Harry [3], Jackson et al. [4], Kramar [5], and Macke and Genari [6] have pointed out the complexity of the field due to the range of definitions and approaches

applied to S-HRM, contextual factors such as geographical location, and a lack of common application of the topic in conceptual and empirical research.

Given the growth and increasing interest in this field, this bibliometric review sought to document and analyze the development of the S-HRM literature over the past 40 years. It did so by addressing the following research questions:

RQ1: What is the volume, growth trajectory, and regional distribution of scholarship on S-HRM?

RQ2: Which journals, authors, and documents on S-HRM had the biggest citation impact?

RQ3: What is the intellectual structure of the S-HRM literature?

RQ4: Which topics in the S-HRM knowledge base have received the most attention from scholars, and what is the 'research front' in this field of sustainability research?

This review used 'science mapping' to document the evolution and assess the current status of the S-HRM knowledge base. Therefore, the focus is not on making sense of substantive findings, but rather on providing a synthesis of the patterns of knowledge production in this emerging field. Science mapping reviews complement those that have used research synthesis or meta-analysis [3–6] by highlighting features of the literature that impact on knowledge production. Science mapping also offers an alternative perspective on the state of the knowledge base in a field at a given point in time.

2. Conceptual Background of the Review

The term S-HRM was introduced around the turn of the millennium. Yet, despite a growing number of recent publications on S-HRM [7–9], research in this field remains in the emerging phase [3,5–7].

Several scholars have attempted to define the concept of S-HRM (see [1,3,4,6] for definitions and conceptualizations). For example:

- "Capacity of organizations to create value in their organizations thereby having the ability and capacity to regenerate value and renew wealth through the application human resource policies and practices. This will entail investment in human knowledge through continuous learning, and the application and development of such knowledge through employee participation and involvement" [10] (p. 60)
- "Sustainable HR strategy can be defined as the management of human resources to meet the optimal needs of the company and community of the present without compromising the ability to meet the needs of the future." [11] (p. 910)
- "Sustainable HRM is the utilization of HR tools to help embed a sustainability strategy in the organization and the creation of an HRM system that contributes to the sustainable performance of the firm. Sustainable HRM creates the skills, motivation, values and trust to achieve a triple bottom line and at the same time ensures the long-term health and sustainability of both the organization's internal and external stakeholders, with policies that reflect equity, development and well-being and help support environmentally friendly practices." [12] (p. 3)
- "The basic concept underlying the sustainable HRM discussion is that firms seek different kinds of outcomes to satisfy their stakeholders' expectations. These outcomes may be economic, social, human, and ecological, and firms often seek them simultaneously although any one of the outcomes may be more important to an organization than others." [13] (p. 4).

Given the conceptual variety and contemporaneity of the theme [5,13,14], several models of S-HRM have been proposed [5,7,10,12,15–17]. Although the main focus of all these models is S-HRM, different theoretical approaches are used for these models, encompassing different components. In addition, the contents of the same component vary [18].

As suggested above, no consensus has been achieved on the definition of S-HRM [5,19,20]. Given these difficulties in conceptualization, a variety of terminology has been used to link the topics of sustainability and HRM. This includes Sustainable HRM [11,21], Sustainable Work Systems [22], HR Sustainability [10,23], Sustainable Management of HR [15,24,25], Sustainable Leadership [26,27], and

Corporate Sustainability [28]. While these terms differ in the degree in which they aim to reconcile the goals of economic competitiveness, positive human/social outcomes, and environmental outcomes, they all recognize the organization's human and social perspectives either explicitly or implicitly, and the impact that human resources have on the organization's survival and success [5].

In an attempt to create an overview of the development of S-HRM scholarship, Ehnert and Harry [3] identified three 'waves of research' in S-HRM. Initial studies on S-HRM emerged from countries such as Germany [29], Switzerland [16], and Australia [30] and provided the first definitions of this construct [3]. For example, Zaugg, Blum and Thom [16] defined S-HRM as "long term socially and economically efficient recruitment, development, retainment and dis-employment of employees" (p. II). Most definitions during this first 'wave' revolved around sustainable work systems taking into account their economic, environmental, and social dimensions [3].

Research in a second 'wave' linked sustainability and HRM more comprehensively and provided further insights by connecting the concept of sustainability with various HR issues including studies on a sustainable human resource strategy to reduce the negative impact of downsizing decisions [11], sustainability as a new paradigm for HRM and talent management [31], the importance of human sustainability [32], and a stakeholder theory approach to S-HRM [33].

The third 'wave' of publications include interdisciplinary studies that focus on a broader understanding of HRM's role connected to a societal discussion of sustainable development [5,12,21,34]. Ehnert and Harry [3] observed that most studies in this period omitted to fully explore multiple dimensions of sustainability simultaneously. Rather, competing conceptions evolved such as Green HRM supporting environmental sustainability while conceding to the dominance of maximizing economic performance [1,4,35] and Socially Responsible HRM [36–41] focusing on social sustainability and corporate social responsibility (CSR).

In a recent review of the S-HRM literature, Macke and Genari [6] identified two distinct and complementary topical foci within the literature: the role of HRM in the promotions of organizational sustainability and the sustainability of HRM processes. The first approach focused on the role of HRM in contributing to organizational sustainability [42] through certain practices that help to influence people in developing sustainable attitudes and behaviors [12,27,43]. Examples of such practices include the attraction of talent due to the sustainability commitment of the organization; training in knowledge acquisition and capability development supporting sustainability goals; integration of sustainability goals into practices of assessment and compensation; building an organizational culture that encourages the development of sustainability practices; organizational support fostering corporate sustainability behaviors; diversity initiatives; and internal communication to strengthen the focus on corporate sustainability [12,35,44].

The second approach incorporates sustainability principles into HRM practices [14,45,46]. Gollan [10] developed one of the pioneering studies presenting the sustainability concept in HRM and indicated that organizational sustainability must be based on acknowledgement, recognition, and development of the abilities of employees. If these issues are not considered, it is highly likely that an organization will lose its talents.

Within this approach, S-HRM practices focus on three principles [15]. The first principle concerns the organization's ability to attract and maintain talent, and to be regarded as an organization for which employees wish to work, which means becoming an attractive organization in comparison with the other enterprises. In this respect, the organization should implement practices aimed at ensuring an engaging work environment, fostering a diversity of cultures and gender and equal opportunities, promoting the socially responsible and credible reputation of organization, supporting work-life balance, and establishing suitable reward practices [13,15,47].

The second one comes from the need for motivated and healthy employees. An organization should develop actions to promote occupational health and safety, reduce and prevent stress, adjust workforce appropriately to accomplish goals, design ergonomic working conditions for employee well-being, and favor work-life balance [10,13,15,47].

The third principle is related to investment in employee qualification, with the current and future scenarios. An organization should develop actions in the area of education and long-term learning, training and development programs for individual, team, and management-levels, professional or internship training programs, talent management and internal program sequence, tutoring and mentoring activities that support employee employability [10,15,31,47].

Figure 1 presents a conceptual model of S-HRM, adapted from Macke and Genari [6]. This integrated model outlines the two main conceptualizations of S-HRM. The two main approaches are: (1) HRM supporting organizational sustainability and (2) S-HRM practices. The model also illustrates the key stakeholders, particularly employees that are relevant in the context of S-HRM. In this connection it is worth mentioning that the concern for employees as key stakeholders has often been criticized as missing in the strategic HRM literature [48]. In this model, sustainability can be seen both as a means and as an end. It is a way of making processes more sustainable but also helps to achieve sustainability of the company operations overall. While the model includes ‘leadership’ as a promoter of sustainable development and as an important factor for meeting the expectations of stakeholders, this topic was not included in the focus of this bibliometric review.

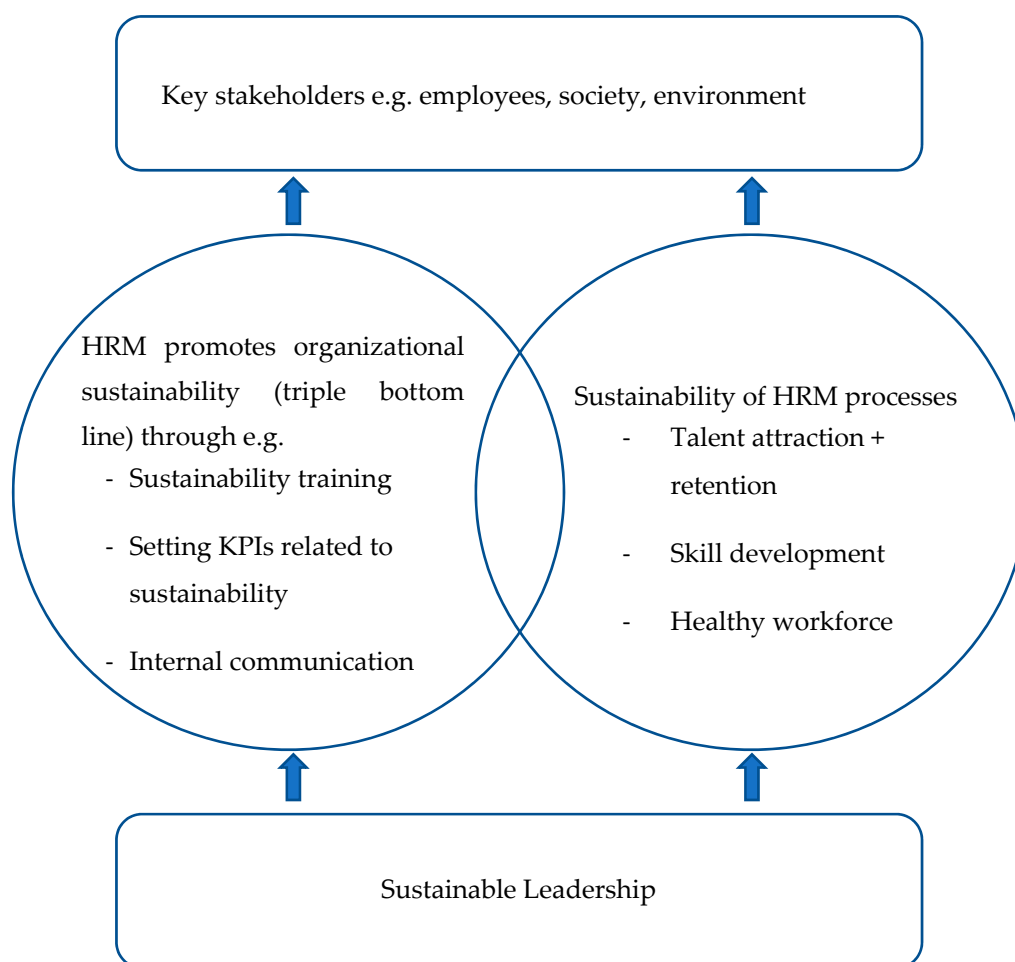


Figure 1. Conceptual model of S-HRM (adapted from Macke and Genari [6]).

The organization of the present study as well as interpretation of the results were informed by this conceptual model. During the document search stage, for example, the model was used to assist in determining the ‘eligibility’ of documents for this review.

3. Method

Bibliometric reviews have gained influence in recent decades as they allow comprehensive analyses of knowledge accumulated over time [49–51]. In this article, we focused on a form of bibliometric review called ‘science mapping’. The benefits of science mapping are that it adopts a macro focus and introduces quantitative rigor into the evaluation of literature. It helps to reveal the structure and dynamics of scientific knowledge production and provides a graphical description of a research field [50]. We used science mapping to review accumulated research in S-HRM in relation to the four research questions stated earlier.

3.1. Search Criteria and Selection of Sources

Our search was conducted in the Scopus index, one of the main scientific databases used by scholars worldwide. The scope of this review included studies on S-HRM in an organizational context. We only selected studies that focused explicitly on HRM issues and excluded studies on related topics such as leadership, change management, knowledge management, and strategic management. We also excluded studies that did not specifically focus on a sustainability perspective. For example, studies that merely used the term “sustainable” as a buzzword without specifically adopting a sustainability approach were not included in the selection.

With respect to the timeframe of the search, we decided to leave the start date undefined and continued up to the end of March 2019. In terms of document types, we included journal articles, books, book chapters, and conference papers in order to develop a broad-based set of articles for review.

In our literature search we followed the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) guidelines [52] (see Figure 2). The search for relevant documents was complicated by the fact that S-HRM is a broad construct that encompasses multiple dimensions including sustainability, management, and HRM. This type of search using the Scopus search engine is painstaking and laborious.

- Our first search focused on the keywords (TITLE-ABS-KEY (“sustainable”) OR TITLE-ABS-KEY (“sustainability”) AND TITLE-ABS-KEY (“HR”) OR TITLE-ABS-KEY (“Human Resource”)). This search produced 4475 documents. We assessed all document abstracts for eligibility and selected 351 documents. We then conducted additional searches and assessed all document abstracts for eligibility.
- The search on (TITLE-ABS-KEY (“HR”) OR TITLE-ABS-KEY (“Human Resource”) AND TITLE-ABS-KEY (“triple bottom line”) yielded 31 documents, from which we selected 13 as eligible.
- The search TITLE-ABS-KEY (“CSR”) AND TITLE-ABS-KEY (“HR”) OR TITLE-ABS-KEY (“Human Resource”) produced 408 documents of which 126 were eligible.
- Finally, we searched on HR sub-functions using the following keywords: (TITLE-ABS-KEY (“appraisal”) AND TITLE-ABS-KEY (“sustainable”) OR TITLE-ABS-KEY (“sustainability”) AND TITLE-ABS-KEY (“HR”) OR TITLE-ABS-KEY (“human resource”) that produced 49 documents of which 10 were eligible.
- The search TITLE-ABS-KEY (“recruitment”) AND TITLE-ABS-KEY (“sustainable”) OR TITLE-ABS-KEY (“sustainability”) AND TITLE-ABS-KEY (“HR”) OR TITLE-ABS-KEY (“human resource”) produced 148 documents of which 25 were eligible.
- The search TITLE-ABS-KEY (“succession planning”) AND TITLE-ABS-KEY (“sustainable”) OR TITLE-ABS-KEY (“sustainability”) produced 73 documents of which two were eligible.
- The search TITLE-ABS-KEY (“Training”) AND TITLE-ABS-KEY (“sustainable”) OR TITLE-ABS-KEY (“sustainability”) AND TITLE-ABS-KEY (“HR”) OR TITLE-ABS-KEY (“human resource”) produced 729 documents of which 69 were eligible.
- The search TITLE-ABS-KEY (“Development”) AND TITLE-ABS-KEY (“sustainable”) OR TITLE-ABS-KEY (“sustainability”) AND TITLE-ABS-KEY (“HR”) produced 442 documents of which 21 were eligible.



Figure 2. PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) flow diagram detailing steps in the identification and screening of sources.

The most common reason for excluding documents was lack of integral focus on HRM. In many cases, the documents just mentioned the term as one of several managerial functions in the text. A second common reason was that many documents only used the word “sustainable” in a general way. Sustainability was not a central focus of the study. In addition, during this iterative search process, some of the newly selected documents overlapped with earlier searches. Thus, duplicates had to be eliminated. When all remaining eligible documents were merged into a single list in Scopus, the final database consisted of 475 S-HRM Scopus-indexed documents.

3.2. Data Analysis

Next, we prepared for bibliometric analysis by exporting the bibliographic data associated with the 475 documents into an Excel file. The bibliographic data comprised author name and affiliation, article title, keywords, abstracts, and citation data. This Excel file was then analyzed with the help of VOSviewer, a bibliometric analysis software program [53]. A copy of the Excel file was saved for use in supplementary descriptive data analyses.

We analyzed our data using both descriptive statistics and bibliometric analysis. Descriptive statistical analyses were carried out in Excel as well as in Scopus and VOSviewer. These focused on documenting essential characteristics of the S-HRM knowledge base including size, growth, and regional distribution of the documents.

Other bibliometric analyses used citation and ‘co-citation’ analysis to capture influential authors, documents and journals within the field of S-HRM. Citation analysis indicates how many times documents in the review database have been cited by documents located in the index from where they were sourced (e.g., Scopus, Web of Science, Google Scholar). In this review, we refer to these as ‘Scopus

citations'. Citation metrics (e.g., total citations, citations per document, h-index) are commonly used in the evaluation of research [54], and are used in this review as one measure of the influence of authors, documents, and journals.

Co-citation analysis provides insights into scholarly influence by identifying the frequency with which two items are cited together by other scholars [50]. In contrast with direct citation analysis which analyses the citation of the review documents themselves, co-citation analysis examines the extent to which cited references located in the reference lists of documents in the review database have been co-cited. In order to illustrate this distinction, we note that, in this paper 'author citation analysis' was conducted on the 475 documents in our review database, while author co-citation analysis included the 27,227 authors located in the references cited in the 475 review documents. Thus, co-citation not only offers a relational perspective on citation impact (e.g., how frequently are two authors cited together), but also captures a much broader literature than direct citation analysis. Thus, we assert that these two types of citation analysis offer complementary perspectives the influence of authors, documents, and journals in this literature.

In this paper, we used author co-citation analysis (ACA) and document co-citation analysis (DCA) to identify the most influential co-cited authors and co-cited documents in the field of S-HRM. Author co-citation analysis was also used to explore the intellectual structure of the S-HRM literature. VOSviewer software was used for this analysis because it allows to not only calculate co-citations but also to create network maps (visual representations) of the relationships among authors [53]. Authors who are frequently co-cited are considered to share an intellectual affinity or shared conceptual perspective. An author co-citation map organizes authors on the basis of these relationships as a mean of revealing key 'Schools of Thought' comprised of groups of 'like-minded' scholars.

Keyword co-occurrence analysis or co-word analysis was used to address the final research question concerning key topics in the S-HRM literature. Zupic and Čater [50] noted that the co-occurrence of specific words in documents suggests that the concepts behind them may be linked. The result of co-word analysis is a network of topics and their relationships, representing a field's conceptual space. Co-word analysis supplements previous citation analyses by highlighting topics of interest to scholars within a literature [50]. It should be noted that, in contrast to co-citation analysis where themes were inferred from visualized relationships among authors, co-word analysis uses actual text extracted from the articles to identify topical themes [55]. Finally, in VOSviewer is also able to display the results of co-word analysis in a temporal display that highlights the topics of most recent focus among scholars in the field. These comprise what Price [56] termed the 'research front'.

4. Results

Next the results of these analyses are presented with respect to the four research questions.

4.1. Volume, Growth Trajectory, and Regional Distribution of the S-HRM Literature

From the early 1980s to the present (February 2019), a total of 475 documents S-HRM documents were identified in the Scopus database. These included 355 journal articles, 47 conference papers, 36 book chapters, 23 reviews, 10 books, two notes, one editorial, and one letter.

Figure 3 shows a very slow growth trajectory during the 1980s and 1990s. The earliest paper on S-HRM identified by our Scopus search was published in 1982, "Corporate Self-reliance and the Sustainable Society" authored by Crouter and Garbarino [57]. During the 1990s four documents were published on S-HRM:

- "Market Dynamics and Sustainable Organisations: HRM implications in the Pulp and Paper Industry's Management of Environmental Issues" [58];
- "Greening People: Human Resources and Environmental Management" [59];
- "Raising Environmental Awareness among the Workforce" [60];
- "Creating and Sustaining Ethical Capability in the Multi-National Corporation" [61].

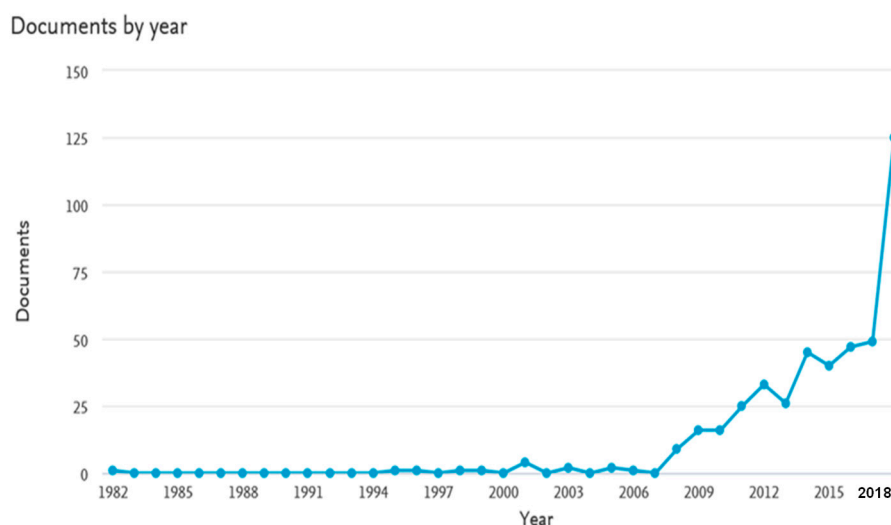


Figure 3. Growth trajectory of the S-HRM literature, 1982–2019 ($n = 475$).

These papers foretell key themes that would subsequently emerge in the S-HRM literature in the post-2000 literature. These include corporate ethics and social responsibility, concerns for the natural environmental, and the link between sustainability and competitiveness. Between 2000 and 2010, 50 documents were published indicating growing interest in this topic among scholars. However, it was not until 2010 that scholarly interest reached a critical mass. Thus, we found that 421 documents of our 475 documents were published between 2011 and early 2019. These data suggest that S-HRM is a young field that is still ‘finding its feet’.

The heat map in Figure 4 shows that knowledge in this field has mostly been produced in the United States (82), the United Kingdom (55), Australia (38), Spain (35), Brazil (34), India (31), and China (29). These countries account for 304 out of 475 documents (64%). This finding is in line with a general trend in management research with its traditional dominance of publications in Anglo-American-European societies with emerging scholarship coming from Brazil, India, and China [62]. While the literature in S-HRM includes contributions from all regions of the world, again Europe and North America stand out. Surprisingly, however, Europe leads the way in this literature: Europe (165), Asia (127), North America (98), Latin America (45), Middle East (32), Africa (22).

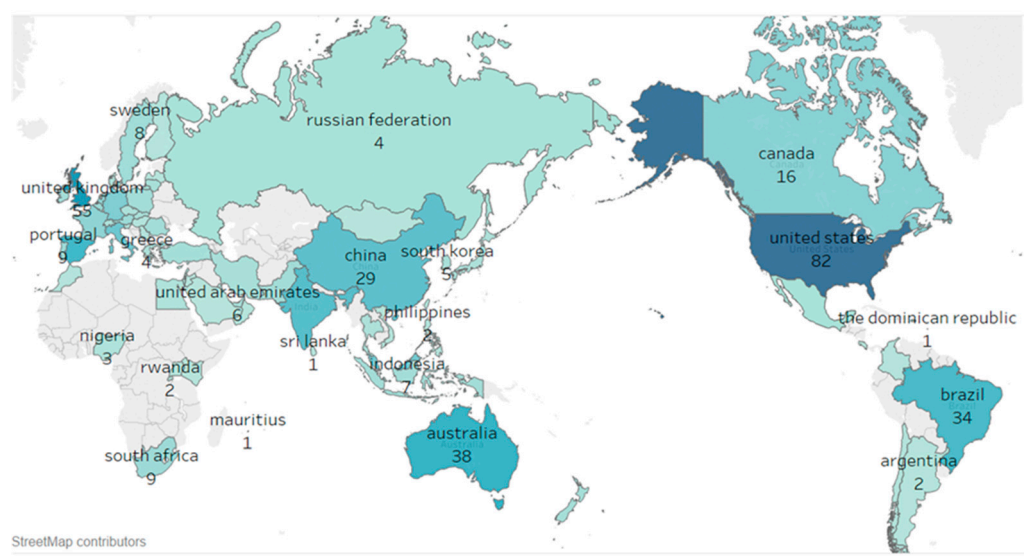


Figure 4. Global distribution of the S-HRM literature, 1982–2019 ($n = 475$).

4.2. Analysis of Influential Sources, Authors, and Documents

The second research question looked at the most important sources, documents, and authors in the S-HRM literature. With one exception, all highly cited ‘sources’ in our review database were journals (see Table 1). The 20 most highly cited sources published 113 articles, representing 24% of the total database of documents. Document distribution across these 20 journals provides further insight into the scope, quality, and scholarly impact in this field.

Table 1. Top 20 sources publishing scholarship on S-HRM ranked by Scopus citation impact.

Rank.	Source	Domain	Number of Documents	Scopus Citations	Scopus Quartile
1	Int’l Jnl of Human Resource Management	Bus and Mgt	20	451	Q1
2	Journal of Cleaner Production	Env Sci	32	377	Q1
3	Int’l Jnl of Operations and Production Man	Dec Sci	2	347	Q1
4	Human Resource Management	Bus and Mgt	7	288	Q1
5	Academy of Management Annals	Bus and Mgt	1	189	Q1
6	Journal of Sustainable Tourism	Soc Sci	5	176	Q1
7	Int’l Journal of Production Economics	Bus and Mgt	3	159	Q1
8	Journal of Business Ethics	Arts and Hum	10	144	Q1
9	Zeitschrift fur Personalforschung	Bus and Mgt	2	141	Q2
10	Management Decision	Bus and Mgt	2	133	Q1
11	Business Ethics	Bus and Mgt	6	126	Q1
12	Advances in Developing Human Resources	Bus and Mgt	6	117	Q2
13	Industrial and Commercial Training	Bus and Mgt	7	88	Q2
14	Resources, Conservation and Recycling	Econ and Fin	5	86	Q1
15	Int’l Journal of Training and Development	Soc Sci	1	83	Q2
16	Personnel Psychology	Psych	1	75	Q1
17	Organisation Management Journal	Bus and Mgt	1	74	Q3
18	Organizational Change for Corporate Sust	N/A	1	69	N/A
19	Scandinavian Jnl of Hospitality and Tourism	Bus and Mgt	1	68	Q2
20	Sustainability (Switzerland)	Soc Sci	27	62	Q2

Scholarship on S-HRM appears to be published in journals with a wide variety of foci. While the majority of journals in Table 1 center around business and management, there are also journals that focus on environmental science, decision sciences, economics, econometrics and finance, social science, arts and humanities, and psychology. This indicates the multidisciplinary nature of scholarship on S-HRM.

The Scopus Quartile analysis of the journals in Table 1 provides a quality assessment of the literature in S-HRM. More than half of the 20 top-cited journals were ranked in Q1, six in Q2, and one in Q3 of Scopus. This analysis reveals that the most highly cited publications in the S-HRM field are published in high quality journals, which can be used as an indicator for the quality of research.

The ability to identify key researchers and documents within a research field is another strength of the bibliometric analysis [51,63,64]. The most active contributors to S-HRM scholarship in terms of the number of ‘Scopus documents’ are Jabbour (21 documents), De Sousa Jabbour (5), Renwick (5), Santos (4), and Teixeira (4) (not tabled). In terms of ‘total Scopus citations’, the most influential researchers in the S-HRM literature, are Jabbour, Jackson, Daily, Huang, De Sousa Jabbour, Jiang, and Schuler (see Table 2).

Table 2. The most highly cited authors on S-HRM, 1982–2019 based on Scopus citations.

Rank	Author	Nation	Documents	Scopus Cites	CPD
1	Jabbour C.J.C.	France	21	703	33.5
2	Jackson S.E.	USA	3	380	126.7
3	Daily B.F.	USA	2	343	171.5
4	Huang S.-C.	USA	1	341	341
5	De Sousa Jabbour A.	France	5	216	43.2
6	Jiang K.	USA	1	189	189
7	Schuler R.S.	USA	1	189	189
8	Boudreau J.W.	USA	1	175	175
9	Ramstad P.M.	USA	1	175	175
10	Santos F.C.A.	Brazil	4	152	38
11	Muller-Camen M.	Austria	2	140	70
12	Renwick D.W.S.	UK	5	140	28
13	Teixeira A.A.	Brazil	4	114	28.5
14	Garavan T.N.	UK	3	113	37.7
15	Kramar R.	Australia	2	107	53.5
16	Latan H.	Indonesia	2	93	46.5
17	Bierema L.	USA	1	83	83
18	Fenwick T.	UK	1	83	83
19	Mcguire D.	UK	1	81	81
20	Gunasekaran A.	USA	2	79	39.5

However, this analysis needs to be interpreted within its context. To begin with, even among these most highly cited S-HRM researchers, the actual number of Scopus citations is generally low. Second, only a few of these researchers in Table 2 are among the top HRM scholars globally (e.g., Jackson and Schuler). Therefore, these findings further support our picture of S-HRM as an emerging knowledge base.

By far the most active and most influential author in the S-HRM domain (in terms of number of publications and in terms of total Scopus citations) is Jabbour. His contributions focus predominantly on the contribution of HRM to environmental management in companies [4,65–69] and on the contribution of HRM to develop sustainable organizations [40]. The authors with the second highest number of Scopus documents in our list are De Sousa Jabbour and Renwick. The authors with the second and third highest number of total Scopus citations are Jackson and Daily. The contributions of De Sousa Jabbour, Renwick, Jackson, and Daily in the field of S-HRM also focus on green HRM, i.e., the impact of HRM on environmental sustainability [1,4,48,65,70–72].

In fact, green HRM appears to be the predominant focus for the majority of our top 20 most highly cited authors. The development of the green HRM literature is based on the recognition that employees are key for a company's environmental efforts. Moreover, green HRM and environmental management in companies are seen as mutually influential. The focus on environmental management in companies influences the formulation of green HRM practices. Additionally, green HRM practices support the environmental performance of a company. The literature identifies several green HRM practices as key elements in the implementation of environmental initiatives. These include green employer branding to attract environmentally-sensitive job applicants, environmental training, green performance appraisal, reward systems that include environmental KPIs, green opportunities for employee involvement and empowerment, among others [4,65,67,71,73].

Other topics which are addressed by authors in the top 20 list include the role of HRM for CSR and the role of HRM for corporate sustainability in general.

Examination of the most highly cited documents in the S-HRM literature (see Table 3), substantially reinforced the above-mentioned patterns. For instance, Anglo-American researchers again dominate the most highly cited documents listed in Table 3. While scholars from other societies (e.g., France, Austria, Germany, Spain, Italy, Poland, Brazil, and Australia) are represented, only one author is from a developing society—Indonesia.

Table 3. The twenty most highly cited S-HRM articles, 1982–2018 based on Scopus citations ($n = 475$).

Rank	Document	Society 1st Author	Area	HRM Focus	Type of Doc	Scopus Cites
1	Daily and Huang [70]	USA	Bus	HRM	Con	341
2	Jackson et al. [48]	USA	Bus	SHRM	Rev	189
3	Boudreau and Ramstad [31]	USA	Bus	Talent	Con	175
4	Lee [73]	Australia	Bus	Env Training	Emp	130
5	Bohdanowicz et al. [74]	UK/	Bus	HRM	Emp	119
6	Jackson et al. [4]	USA	Bus	Green HRM	Rev	117
7	Jabbour and Santos [35]	France	Bus	HRM	Con	100
8	Kramar [5]	Australia	Bus	HRM	Rev	94
9	Fenwick and Bierema [75]	UK	Bus	HRD	Emp	83
10	Garavan and McGuire [76]	UK	Bus	HRD	Rev	81
11	Morgeson et al. [77]	USA	Bus	HRM	Rev	75
12	Jackson and Seo [1]	USA	Bus	Green HRM	Rev	74
13	Jabbour and De Sousa Jabbour [65]	France	Bus	Green HRM	Con	73
14	Benn et al. [78]	Australia	Bus	Change	Book	69
15	Bohdanowicz and Zientara [79]	UK	Bus	HRM	Emp	68
16	Jabbour [66]	France	Bus	Green HRM	Rev	62
17	Teixeira et al. [67]	Brazil	Bus	Env Training	Emp	62
18	Longoni [80]	Spain	Bus	HRM	Emp	58
19	Preuss et al. [81]	UK	Bus	HRM	Emp	58
20	Jabbour et al. [68]	France	Bus	Green HRM	Emp	57

The knowledge base composition was also examined from the perspective of document types. The documents in Table 3 show a balance among empirical, conceptual and review papers. It is interesting to point out that the empirical studies were mostly case studies (not tabled) and only one of the two quantitative studies in the table used a large sample size and advanced analytical methods.

In terms of conceptual foci, the majority of articles in Table 3 focused on the linkage between HRM (or Green HRM/Environmental training) and environmental management/sustainability [1,4,48,66–68,70,73,74,79]. A considerable number of publications also attempted to examine the relationship between HRM/HRD and CSR [74–77,79,81]. The remaining articles paid attention to various topics including HRD and ethics [76], talentship and sustainability [74], green HRM and green supply chain [65], and organizational change and sustainability [78]. It should be noted that only a few studies were devoted to investigating two or more aspects of sustainability [5,35,80] and only one paper included a focus on sustainability of HRM processes [31]. When compared with our conceptual model (Figure 1), this indicates that the majority of top-cited documents focused on macro-perspectives of S-HRM (the left circle in our model) and only one paper included a focus on the sustainability of HRM processes (the right circle in our model).

These traditional citation analyses were then complemented by ‘Document co-citation analysis (DCA)’. DCA analyzes the degree to which documents have been ‘co-cited’ in the review database by documents in the reference lists of the other S-HRM documents. It needs to be pointed out that the ‘co-cited’ papers do not necessarily have to be part of the review database or in the Scopus index. The benefit of co-citation analysis is that it allows to identify linkages between articles in our review database and the broader literature. This type of analysis is therefore likely to provide a wider assessment of scholarly influence than traditional analysis of citations, which is restricted to those articles identified in our Scopus index search.

The results of the DCA in Table 4 support various trends captured in previous analyses. In general, the co-citation levels in Table 4 are rather low. This confirms our assessment of the need to build a consistent critical mass of high impact scholarship. In terms of regional distribution of the documents, they seem to be clustered in Anglo-American societies, while representations from France, Belgium, Brazil, Australia, China, and South Korea also exist. Finally, the journals that feature these highly co-cited documents are generally of high quality (e.g., Academy of Management Journal, International Journal of Management Reviews, and International Journal of Human Resource Management).

Table 4. Rank order of the 20 most highly co-cited S-HRM documents.

Rank	Document	Society	Co-Citations
1	Renwick et al. [71]	UK	31
2	Barney [82]	USA	30
3	Daily and Huang [70]	USA	23
4	Jabbour and Santos [69]	France	21
5	Greening and Turban [83]	USA	20
6	Govindarajulu and Daily [72]	USA	19
7	Jackson and Seo [1]	USA	19
8	Pfeffer [32]	USA	18
9	Brammer et al. [84]	Australia	17
10	Jabbour and Santos [35]	France	17
11	Albinger and Freeman [85]	USA	15
12	Collier and Esteban [86]	UK	14
13	Ehnert and Harry [3]	Belgium	14
14	Huselid [87]	USA	14
15	Sarkis et al. [88]	USA/Spain	14
16	Carroll [89]	USA	13
17	Fenwick and Bierema [75]	UK	13
18	Paillé et al. [90]	Canada	13
19	Peterson [91]	USA	13
20	Aguilera et al. [92]	USA	12

We identified several documents that were included in both the citation and co-citation lists [1,70,75]. Since there is a correlation between co-citation counts and traditional citation counts, a certain overlap is expected between the documents in Tables 3 and 4. Nevertheless, this overlap should not be considered as a given and therefore leads us to the conclusion that these overlapping documents have the greatest influence in this literature.

Two of these three most influential articles focus on potential contributions of HRM to the environmental perspective of sustainability. Jackson and Seo [1] describe opportunities for research at the intersection of strategic HRM and environmental sustainability. Daily and Huang [70] identify HR factors that are critical for the implementation of environmental management systems in organizations. The third article which was included in the top 20 of both the citation and co-citation lists, by Fenwick and Bierema [75] discusses the role of HRD professionals in corporate CSR initiatives. The predominant focus on environmental aspects and on CSR in the most influential papers is also consistent with the frequency of these topics among the 20 most highly cited articles.

4.3. Intellectual Structure of the Sustainable HRM Knowledge Base

Author co-citation analysis in VOSviewer was used to visualize the ‘intellectual structure’ of the field in terms of several ‘Schools of Thought’ (colored clusters). The co-citation network included a total of 27,227 authors, of which 262 met the threshold of at least 20 author co-citations. Figure 5 shows the 100 most highly co-cited authors.

The author co-citation map in Figure 5 shows nodes which represent different scholars. The size of the node relates to the number of author co-citations. Larger nodes therefore represent authors with more co-citations and more influence within the field. The density of ‘links’ between nodes reflects the number of times scholars have been co-cited. Different colored clusters of scholars represent different theoretical perspectives or ‘Schools of Thought’.

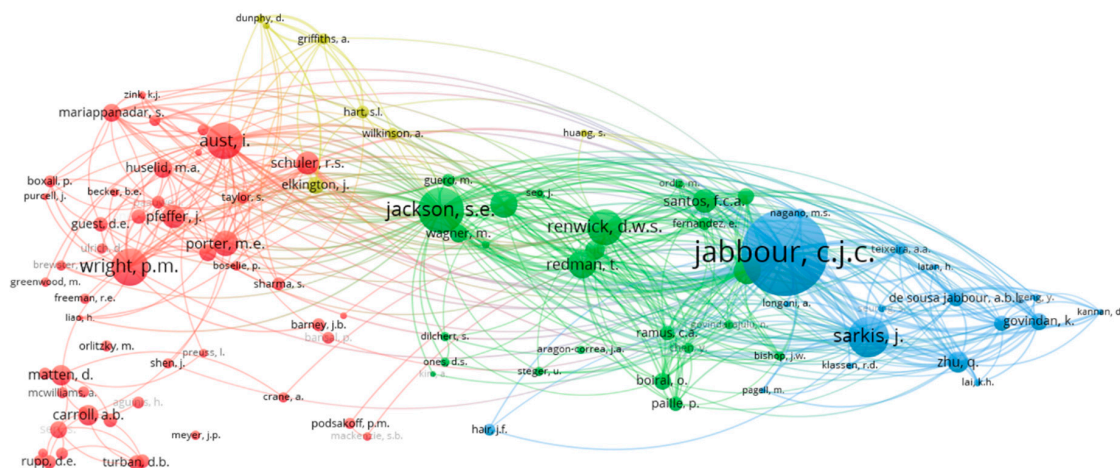


Figure 5. Author co-citation analysis of the S-HRM literature (threshold 20 citations, display 100 authors).

The most highly co-cited authors were Jabbour (387), Jackson (205), Sarkis (183), Wright (168), Aust (formerly Ehnert) (163), and Renwick (160). It is interesting to note that the list of the 20 most co-cited authors included six authors who were not represented in the S-HRM database which served as the basis for this analysis—Wright, Porter, Pfeffer, Carroll, Maguire, Huselid. Their appearance in the co-citation analysis stems from the fact that they were influential in terms of conceptual or empirical contributions in HRM or management in general and were cited by the authors in S-HRM.

Author co-citation analysis groups scholars into clusters or ‘Schools of Thought’ highlighted by different colors in the network map. Each cluster (color) encompasses works with similar features. In order to interpret the nature of the similarities of each cluster and label them, we examined the publications of the authors on the map.

The co-citation network shows four ‘Schools of Thought’ that have influenced the literature on S-HRM. Three of these four Schools focus on topics related to sustainability, whereas one group focuses on more general HR and management related topics. This School (the red cluster) is comprised of authors who specialize in strategic HRM (Wright, Schuler, Pfeffer, Huselid), S-HRM from a paradox perspective (Aust-formerly Ehnert), CSR (Matten, Carroll) and strategy (Porter). Authors in this cluster have been influential in terms of their conceptual contributions. Their work in HRM, CSR, and strategy has been cited by authors in S-HRM and thus they had an impact on shaping the relatively new field of S-HRM [32,48,81,87,89,93–99]. The somewhat separate position of the red cluster in relation to all other clusters indicates that most authors in this cluster are co-cited with other authors from the same cluster and there are fewer co-citations with other clusters. The author Aust (formerly Ehnert), located at the top of the red cluster has received the most co-citations with authors from other clusters which demonstrates her influence as a boundary spanner in the field. Her work focuses on tensions in managing human resources, HRM from a paradox perspective, and S-HRM [3,14,15,20,25].

The yellow cluster’s main focus is on corporate sustainability. Authors such as Elkington, Dunphy, Bann, and Hart have published on the development of corporate sustainability. Dunphy and Bann used an organizational change perspective [28]. Hart [100] introduced a sustainable-value framework that links global sustainability to the creation of shareholder value. While the red, blue, and green clusters appear rather dense (lots of links) and closer together, the yellow cluster is positioned at the edge of the map and shows smaller nodes and less connections to the rest of the map. This indicates that it had less impact on the scholarship in S-HRM and authors from this cluster received fewer co-citations with authors from other clusters.

The green cluster focuses on the environmental perspective on HRM, also called green HRM. Green HRM can be considered a subgroup of S-HRM which focuses exclusively on the ecological aspect of sustainability. Authors in this field, such as Jackson, Renwick, Muller-Camen, Redman, and Daily have examined HRM practices that help to support a company’s environmental agenda.

These ecologically relevant HRM practices have been referred to as green hiring, green training, green performance management, and so on. Their common denominator is that they regard the employees as a key resource in adopting environmentally considerate approaches to business [1,4,70,71].

Scholars in the blue cluster, including the top co-cited author Jabbour, as well as Sarkis, Zhu, and Govindan are associated with research in sustainable supply chain management and its subset green supply chain management [65–67,88,101–104]. While the two terms are often used interchangeably, sustainable supply chain management is broader in its focus, whereas green supply chain management focuses only on the ecological aspects of sustainability. This field has been influential for the scholarship on S-HRM because human resources have been identified as critical for the implementation of sustainable supply chain management. Jabbour, the most highly co-cited author in our network map, is part of this cluster. His position on the co-citation map (within the blue cluster but at the intersection with the green cluster) reflects his efforts in advocating the integration of the research agendas of green supply chain management and green HRM [65]. This integration is a very recent development indeed, as these authors note in their 2016 paper that literature searches prior to 2014 revealed no links between green HRM and green supply chain management.

It is interesting to point out that Jabbour is not only the most highly co-cited author, but also the most highly cited author in S-HRM and an associate editor of the *Journal of Cleaner Production*, the second highest ranked journal publishing scholarship on S-HRM (ranked by Scopus citation impact), all of which reaffirms his centrality and influence in the literature.

It is also interesting to note that none of the top 20 most influential co-cited authors are based in Asia, they are all based in Europe (9), the US (8), Canada (1), Australia (1), and Brazil (1). This reconfirms the substantial influence of European and North American institutions on the S-HRM field.

4.4. Topical Foci of the Sustainable HRM Knowledge Base

To answer the fourth research question, the authors used keyword co-occurrence analysis or co-word analysis to identify emerging topics in the S-HRM knowledge base [55]. VOSviewer has the capability to visualize the co-word results in several different types of displays or co-word maps. We chose the ‘temporal display’ which highlights three different features of topics studied in the S-HRM literature. First inspection of the size of nodes on the temporal co-word map reveals the relative frequency of co-occurrence of different topics in the S-HRM literature. Second, as in the co-citation map, proximity and links offer insight into the relationship among topics. Finally, the color of the nodes on the temporal display indicates the relative recency of different topics as they appeared in our review documents. This temporal analysis is used to identify hot topics or what Price [56] termed the “research front” in the literature.

VOSviewer was set to All Keywords with a co-occurring keyword threshold of at least five cases which yielded 84 keywords displayed on the temporal co-word map in Figure 6. As suggested by the size of nodes on the map, the most frequently co-occurring keywords were ‘human resource management’ (163 cases), ‘corporate social responsibility’ (111 cases), ‘sustainability’ (97 cases), ‘sustainable development’ (96 cases), ‘human resource’ (66 cases), ‘environmental management’ (40 cases), ‘green human resource management’ (37 cases), ‘training’ (34 cases), ‘sustainable human resource management’ (27 cases), ‘resource allocation’ (24 cases), and ‘employment’ (22 cases).

Next, we focused on the temporal dimension of the map in order to identify the most recent topics of interest to scholars studying S-HRM. We used VOSviewer to create a temporal co-word map in order to identify the research front in this literature (see Figure 6). The results shown on the co-word map in Figure 6 were examined by topical recency (i.e., lightest shades) and frequency of occurrence (i.e., node size). Topics with the lightest shade nodes include green HRM and sustainable HRM. The green HRM theme is linked to green supply chain management which appears to be a very recent trend in the literature. This demonstrates that HRM is being recognized as having an important influence on nurturing sustainability in organizations.

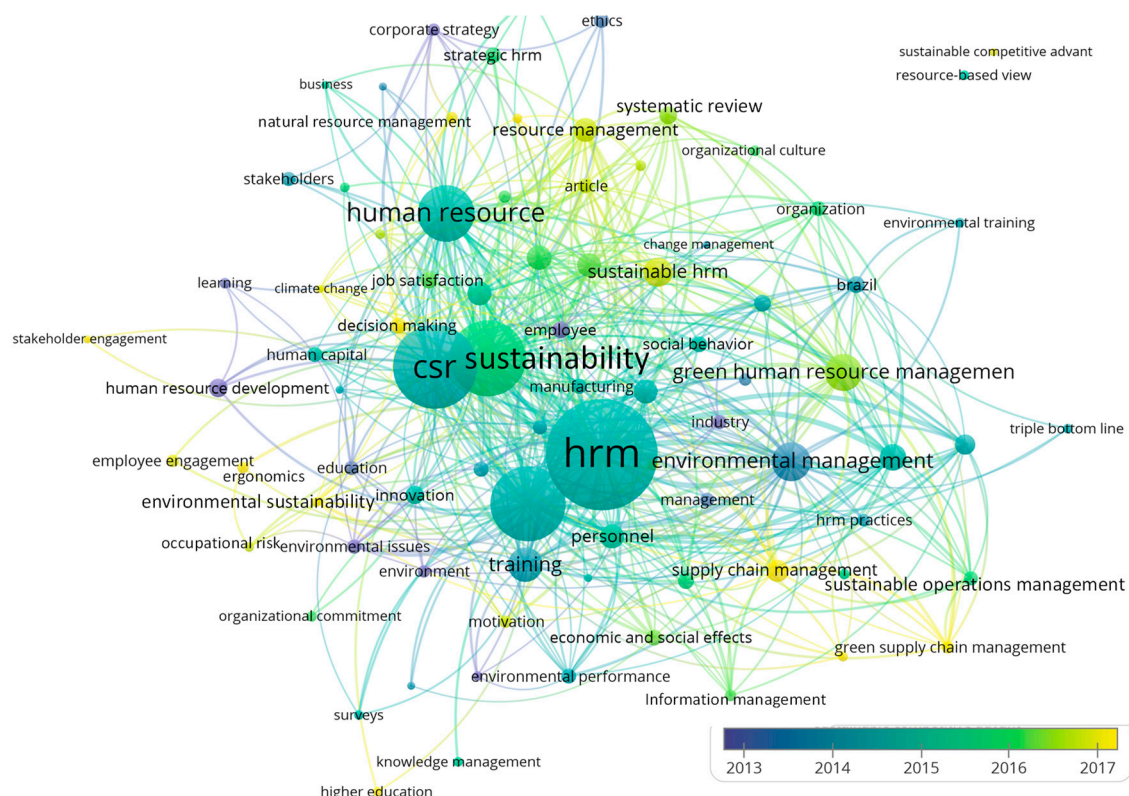


Figure 6. Temporal visualization on a co-word map based on 475 Scopus-indexed S-HRM documents published from 1982 to 2019 (threshold five co-occurrence, display 84 keywords).

5. Discussion

This paper used bibliometric analysis to document the status of the current knowledge base in S-HRM. We analyzed 475 documents in the Scopus database published between 1982 and 2019. In this final chapter we will delineate the limitations of our review and present an interpretation of our findings.

5.1. Limitations

One limitation of our paper is that our literature search was solely conducted within the Scopus database. While this database provides a relatively comprehensive coverage of scholarly contributions, it does not cover all relevant documents in the S-HRM literature. Thus, the S-HRM knowledge base is, in fact, larger than we have portrayed in this paper. To a certain extent, this limitation of our paper was mitigated by the use of co-citation analysis which encompasses all documents in the reference lists of the 475 documents that were analyzed. This allowed us to capture a wider segment of the literature on S-HRM than only the 475 documents in our database.

A second limitation stems from the use of science mapping in this review. Bibliometric reviews allow for the analysis of ‘meta-data’ associated with the scholarly field under review. This type of analysis however does not include the analysis of specific findings from studies on S-HRM. We therefore see one contribution of our paper in laying a foundation for further analyses of research findings in studies on S-HRM.

5.2. Interpretation and Implications of the Findings

In this bibliometric review, we aimed to document the characteristics of the knowledge base in S-HRM. Research question 1 focused on the volume, growth trajectory, and regional distribution of scholarship on S-HRM. We found that it is a very recent area of research which has only gained significant traction in the current decade. Indeed, data analysis revealed that 89% of these S-HRM

documents were published since 2011, and 25% (124 documents) in 2018 alone. Thus, we concluded that despite its birth in the early 1980s, this field of HRM and sustainability research is only now gaining notice.

In terms of regional distribution of these publications, the US, the UK, and Australia were the countries with the highest number of contributions. It is also noteworthy that, even though the contributions overall came from a variety of countries, the majority of top most cited authors/papers were also from the US and the UK. Regional analysis pointed to a predominance of Anglo-American-European scholarship in terms of numbers and impact.

The relevance of this analysis lies in the two sets of facts. First, there is widespread acceptance that many management practices, including or especially those associated with HRM, are subject to the influence of cultural context [105–107]. Second, the effects of unsustainable development are predicted to impact developing and emerging societies most urgently and significantly [108]. With this combination of factors in mind, a S-HRM literature that lacks global diversity will only offer limited assistance to policy and practice. Thus, we identify this as a limitation of the current literature on S-HRM.

Research question 2 focused on journals, authors, and documents on S-HRM with the biggest citation impact. Author citation analyses indicated that majority of key researchers in S-HRM come from USA (Jackson, Daily, Huang, Jiang, Schuler, Boudreau, Ramstad, Bierema, and Gunasekaran). Others are located in UK (Renwick, Garavan, Fenwick, and McGuire), France (Jabbour and De Sousa Jabbour), Brazil (Santos and Teixeira), Austria (Muller-Camen), Australia (Kramar), and Indonesia (Latan). However, even among the most highly cited S-HRM researchers, only a few are globally recognized, and their level of Scopus citations is generally low. This suggests that S-HRM is not yet established in the mainstream of either HRM or sustainability literatures.

Document quality assessment revealed that 18 out of the 20 most highly cited documents in the review databased were published in Scopus Q1 and Q2 journals. With reference to the short history of S-HRM, this finding should be seen as a positive sign of meeting good standards of quality for at least part of the knowledge base. In line with the observations of Ehnert and Harry [3], the majority of the most highly cited S-HRM studies paid attention to concurring concepts including Green HRM, focusing on environmental sustainability, and Socially Responsible HRM focusing on social sustainability and CSR; however very few studies attempted to explore various aspects of sustainability simultaneously. Additionally, only one study among these most highly cited articles focused on the sustainability of HRM processes. Thus, we call for research that incorporates sustainability principles into HRM practices and research that investigates all aspects of sustainability.

Research question 3 focused on the intellectual structure of the S-HRM literature. From our author co-citation analysis, we identified four Schools of Thought that were influential for the literature on S-HRM. These include green HRM (green), sustainable supply chain management (blue), strategic HRM/CSR/Strategy (red), and corporate sustainability (yellow). The strategic HRM/CSR/Strategy (red), the corporate sustainability (yellow), and the sustainable supply chain (blue) Schools of Thought all provide insights from the bigger picture within which S-HRM plays a role. The green School (green HRM) is a subset of S-HRM focusing only on the environmental perspective. We can thus conclude that S-HRM is positioned at the intersection of strategic HRM, CSR, corporate sustainability, and supply chain management, and draws inspiration from these lines of research.

The keyword co-occurrence analysis confirms this interpretation with 'human resource management', 'corporate social responsibility', and 'sustainability' being the most frequently co-occurring keywords, i.e., the predominant topical foci in the S-HRM literature (research question 4). The temporal keyword analysis also highlights the very recent link between green HRM and supply chain management which indicates a new 'research front' in this field of sustainability research.

6. Conclusions

This science mapping review of the research on S-HRM aimed to provide an overview of the current status of this young knowledge base. We identified a knowledge base characterized by a high level of complexity due to a range of definitions and a plurality of approaches in conceptual and empirical research. Our analysis of the intellectual structure of the S-HRM field positioned it at the intersection of strategic HRM, CSR, corporate sustainability, and supply chain management. This provides opportunities for further research benefitting from cross-disciplinary fertilization among these themes.

Our analysis revealed that the field is currently dominated by Anglo-American-European scholarship both in terms of numbers and also in terms of impact. Given the importance of the cultural context on HRM, we call for more contributions from other regions of the world taking into account the local context. Cultural values not only influence the design of HRM systems [48], they also influence the debate on sustainability, in particular the perceived importance of sustainability [32]. What is more, the effects of unsustainable development are expected to impact developing societies more significantly. The S-HRM literature would therefore benefit from more diversity in terms of regional contributions from developing societies to offer assistance to local policy and practice.

In terms of conceptual foci, the majority of the top cited S-HRM documents focused on the relationship between HRM and environmental management, as well as the relationship between HRM and CSR. This focus corresponds with the macro perspectives of S-HRM which sees the role of HRM to support sustainable outcomes (the left circle in our conceptual model, see Figure 1). However, very few among the top-cited documents in our database explore several aspects of sustainability simultaneously (environmental, social, and economic). Thus, we call for research that investigates multiple aspects of sustainability to explore the full complexity of the topic. Referring to the right circle in our conceptual model (Figure 1), only one paper in our top 20 list focused on the sustainability of HRM processes [31]. We therefore advocate more research on the sustainability of HRM processes and practices, in other words the meso and micro perspectives focusing on HR systems and employee well-being.

The review hopes to provide guidance to a new generation of S-HRM scholars around the globe to quickly grasp the field's intellectual structure so that this currently emerging knowledge base can promptly 'find its feet'.

Author Contributions: A.K. and P.R. jointly conceptualized the study, gathered the document database, worked on data analysis and preparation of the manuscript.

Funding: This research was funded by Thailand Sustainable Development Foundation, grant number 008/2561.

Conflicts of Interest: The authors declare no conflict of interest.

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