

A Bibliometric Review of Global Research on Human Resources Management and Supply Chain Management

Rashed Mahmud Shakil^{#1}, Md. Alamgir Mollah^{*2}, Shawkat Tanveer Rahman^{#3}, Md. Mamun Habib^{*4}

^{#1}*School of Human Resources Development Psychology, Universiti Teknologi Malaysia, Malaysia*

^{*2}*Graduate School of Business, Keimyung University, People's Republic of Korea*

^{#3}*Azman Hashim International Business School, Universiti Teknologi Malaysia, Malaysia*

^{*4}*School of Business & Entrepreneurship, Independent University, Bangladesh*

¹rs.shakil1310@gmail.com

²alamgir1003@yahoo.com

³rahman.shawkat@yahoo.com

⁴mamunhabib@iub.edu.bd

Abstract— Human resource management (HRM) and supply chain management (SCM) play a growingly vital role in the organizational prosperity and economic development of countries that accelerate the importance of tracing the trajectory relating to this emerging field. However, till recently, limited number of studies have examined the evolution of HRM-SCM research quantitatively. Aiming to provide an overall insight into the research in HRM-SCM field, this study utilized science mapping tools for analysing 469 articles from Scopus database explicitly related to HRM-SCM research. This bibliometric review aimed at documenting the size, geographic distribution of relevant literature, and growth trajectory, identifying key authors, journals, and documents, highlighting emerging topics, and analysing the intellectual structure of HRM-SCM knowledge base. Being the first bibliometric analysis on HRM-SCM field, this review contributes to the extant HRM-SCM literature by providing a key reference for researchers entering this field, along with guidance regarding high value frameworks, and foci for future research.

Keywords— Human Resource Management, Supply Chain Management, Bibliometric Analysis, Science Mapping.

1. Introduction

With the current growing globalization and related increasing demand for bringing talented professionals of supply chain, HRM issues in SCM has turned up as the firms' top priority [1]. The continuous change in business environment along with the emergence of globalized market have made supply chain profession challenging in recent years demanding a range of competencies and skills for managing globe spanning functions of supply chain effectively. SCM is referred as the combination of essential business processes managed by suppliers providing information, products and services which add value to the end users [2]. In addition, supply chain is characterized as a "human chain" while SCM denotes the composition of workforce who are responsible for managing supply chains [3]. However, the shortage of skilled, experienced, and talented human resources might lead the firms to suffer

from the constant lack of qualified supply chain managers, thereby resulting in a talent deficiency "tsunami" in near future [4], [5].

In the contemporary years, the contribution of HRM has gained immense popularity in SCM research because the logistics process within the supply chain is inevitably "human centric" [1], [6]. Being a key human dimension, SCM places emphasis on mutual cooperation and communication that happens among all concerned parties constituting the supply chain efficiently [2]. According to Stadler [7], SCM denotes an integrated approach in business based on the reciprocal collaboration, not merely across all the firm's functional areas, but all the members in supply chain too. In fact, competent human resources accelerate SCM performance through offering a distinct source of sustainable advantage in this competitive world [5], [8]. Moreover, a number of authors namely Gómez-Cedeño et al. [2], Kasonde and Steele [9] in the extant SCM literature acknowledged human resource as a crucial component of SCM. The consensus has been made by Hohenstein et al. [1] mentioning that the ground of supply chain agenda is formed by five pillars and the "right talent" is the key one.

Although the issue of HRM in SCM research grabbed the attention of numerous scholars, very few researches attempted to measure and analyse the scientific publications from the global context. Most notably, the extant SCM literature widely acknowledged the high influence of strategic HRM on SCM performance but the analysis on the trends and nature of global research on HRM and SCM remained under-researched. In particular, Yogi and Kotzab [10] conducted a bibliometric citation meta-technique reviewing the performance models in SCM from the period of 1990 to 2017. Their study sample incorporated 2,340 articles utilizing the Web of Science (WoS) Core Collection. Another study by Mishra et al. [11] adopted the bibliometric technique for reviewing the supply chain performance measures and metrics of 234 articles published between the year 1991 and 2014. Likewise, Ye [12] presented the research trends and knowledge mapping based on SCM from the social network perspective for a period of 16 years starting from 2003 by applying the WoS core database. Based on the prior published studies, it is evident that the global research trends in scientific

publications regarding HRM issues in SCM is largely lacking in the growing SCM literature.

Our objectives in this paper are as follows: i) to examine the HRM-SCM journal articles based on the temporal distribution patterns; ii) to focus on the analysis of keywords of research hotspots on HRM-SCM research; iii) to demonstrate the prolific authors' contributions, most productive institutions, and the leading countries; iv) to identify the underpinning theories applied in HRM-SCM research; and v) to provide in-depth understanding of potential collaborations as well as future directions. This study will benefit policy makers, individuals, and researchers to comprehend the trends of global research in HRM-SCM together with finding out the opportunities and potentials for aspiring future scholars.

2. Methods

The study of bibliometric analysis includes a mechanistic method for understanding the global trends of research in a particular field focusing on the database of scholarly literature [13]. This type of method makes distinction from review paper to bibliometric analysis paper that mainly highlights on discussing the recent progress, evolution, and intellectual structure of knowledge base of a specific topic [14].

2.1. Data source and search strategy

At the first stage of beginning the bibliometric review process, a database with relevant literatures needs to be obtained. In spite of having a high correlation between scopus and WoS databases i.e. overlap of journal indexing, different journals are also indexed in both databases [13]. The Scopus database was applied in this bibliometric review because of its largest coverage of social science studies for identifying relevant, high quality documents for

analysis [14]. Additionally, the platform is intended to provide a comprehensive bibliometric data along with the simple extraction procedure, which is appropriate for carrying out bibliometric analysis.

We applied Scopus database for conducting data mining within September 20 and 26, 2019. It is worth noting that only journal articles are taken into account in this analysis instead of conference papers, reviews, book chapters, editorial etc.- since these are viewed as "certified knowledge", an articulation used to explain knowledge based on peer review [15].

In this bibliometric review, we followed several stages for identifying and searching the appropriate documents from Scopus (Figure 1). This study applied the central theme of research articles including "Supply chain" AND "Human resource*" in the title, abstract, and keywords. Initially the query search string was: (TITLE-ABS-KEY ("Supply chain" AND "Human resource*")) generating 884 documents. The time frame of publication was from 1996 to September 2019. After imposing the exclusion criteria, we set the search string: (TITLE-ABS-KEY ("Supply chain" AND "Human resource*")) AND (EXCLUDE (PUBYEAR, 2020)) AND (LIMIT-TO (SRCTYPE,"j")) AND (LIMIT-TO (DOCTYPE,"ar")) resulting in 476 documents. We also added additional phrases in query string to ensure that there were no review articles in our analysis which produced 124 documents being potentially inappropriate to our study. The phrases added in the search string included recent, review, progress, revisit, critical, highlight, advance in the title, abstract, and keywords. After proper screening the abstracts and full-texts of 124 documents, we selected 7 review articles. In Scopus database, a unique article identifier called EID was extracted from every single review article and added in search string in order to ensure that they would be excluded from searched results.

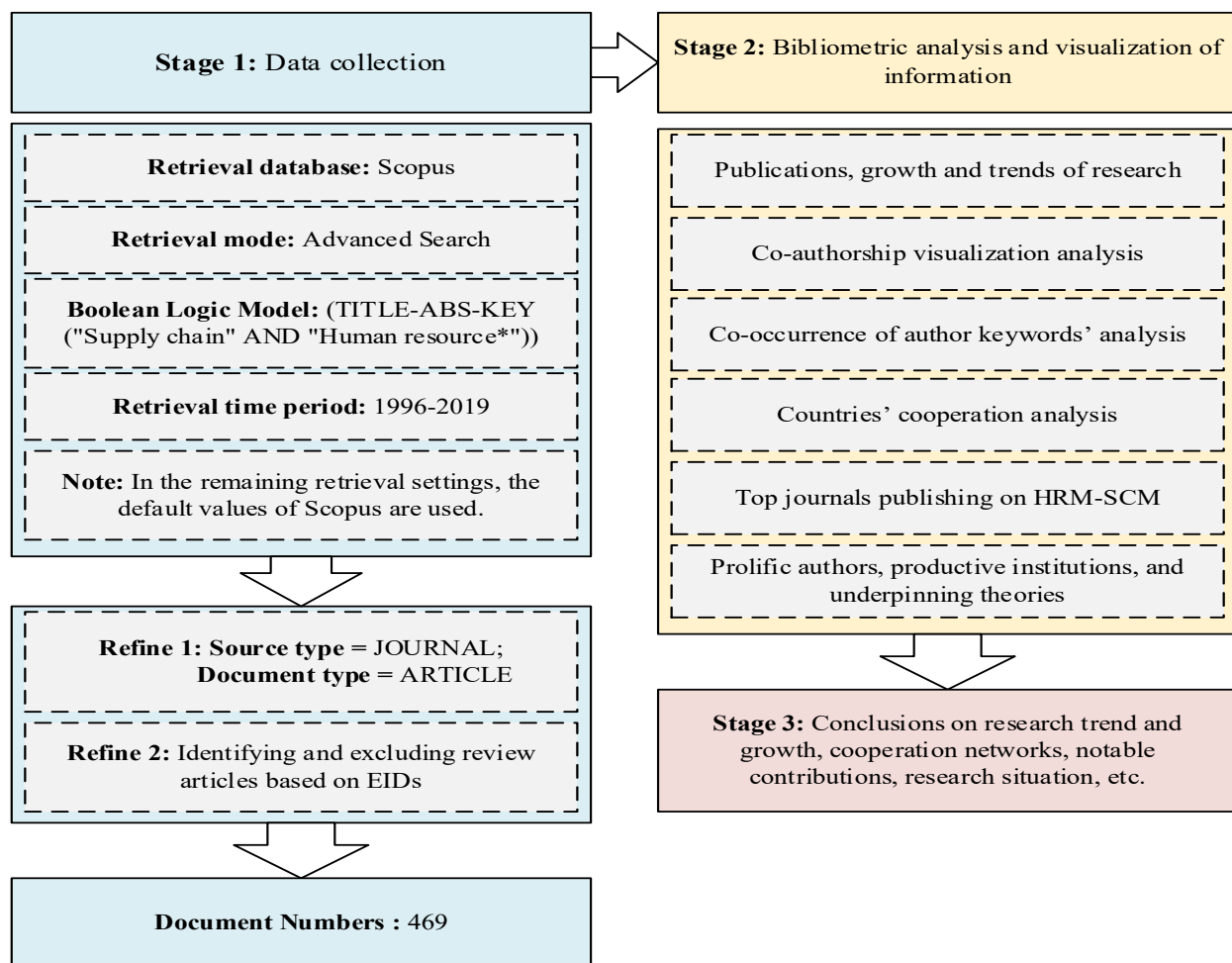


Figure 1: Stages of bibliometric analysis on HRM-SCM research.

It is worthwhile to note that the application of author ID is the best way of obtaining the most precise data on the output of particular author (field code in Scopus: AU-ID). The profile of an author refers to the collection of different names placed on a single profile. For instance, the data we exported had the name Jabbour twice as last name with different initials like Jabbour, A.B.L. (6 articles) and Jabbour, C.J.C. (5 articles).

Our study obtained the information regarding single-country publication (SCP) by restricting the search results into a particular country applying the field code in Scopus-AFFILCOUNTRY.

After getting the results of searching the key theme, the analysis was made based on source, year, affiliation, author, subject area, document type, and country/territory. Bibliometric indicators namely CiteScore, total citations, h-index, and total publications were utilized for the purpose of ranking [13].

2.2. Bibliometric maps

In this study, the VOSviewer (version 1.6.11) software was used for exporting the bibliographical, author keywords, and citation information of 469 articles. VOSviewer is a network software tool for visualizing and constructing bibliometric maps [13]. This program is freely available handling a large database, and also able to construct the network with visualised graphical representations [16]. In

the graphics, the density, cluster, labels, and proximity are displayed, which is effective to interpret science mapping analysis [17]. In addition, maps generated by applying VOSviewer incorporate items. These items are considered as objects of interest in this study, namely author keywords or countries. There may exist a link- relation or connection between the pair of items. Every link contains a strength representing a positive numeric value. The higher number of the value indicates the strength of the link.

The analysis of co-authorship involves the link strength within countries indicating the number of publications co-authored by two affiliated countries, while the total link strength points out a country's total strength relating to the co-authorship links with other countries. Likewise, the co-occurrence analysis includes the link strength within author keywords indicating the number of publications where two keywords are existed together. The user manual of VOSviewer illustrates the features in details [18].

2.2.1. Co-authorship Analysis

In analysing co-authorship, our study incorporated all 95 countries with the affiliation of 155 authors. The clustering of affiliated countries was made based on 5 continents namely Asia, Europe, America, Africa, and Oceania.

2.2.2. Co-occurrence Analysis

In order to analyse the co-occurrence of author keywords, initially we found 1575 keywords from our Scopus extracted data. Next, we exported the VOSviewer list of keywords for checking the relevant keywords. After that we found certain generic phrases and synonymic words which were analysed by creating a thesaurus file. For example, supply-chain management, scm, and supply chain management (scm) were re-labelled as one name called supply chain management. After attaching the thesaurus file to VOSviewer, we set our minimum occurrences at 3 and found 104 out of 1565 keywords meeting the criteria. At our subsequent screening of keywords list, we deselected 18 irrelevant keywords so that these keywords are not appeared in our list which resulted in 86 keywords in our final VOSviewer map. Furthermore, we selected the overlay visualization mode for viewing the average publication year, link strength, and number of occurrences of the keywords.

3. Findings

3.1. The results of publication, growth and trends of research

The number of research articles published for the period of 24 years was 469 (Figure. 2). The oldest publication year was 1996 having only 1 article. The number of published articles fluctuated till the year of 2006 and it can be suggested that HRM-SCM research captured the interest of researchers after the year 2006. Then the number of publication continued to increase till the year 2010 publishing 26 articles and the number dropped to 21 during the year 2012. In spite of fluctuations in number of published articles, the significant increase in publication is witnessed in the year 2016 getting 52 articles which doubled the number of articles published in 2010. Although the number of articles declined in subsequent year, the growth continued till recently. Therefore, we can anticipate that the research publication will sustain its continuity to rise in the upcoming years.

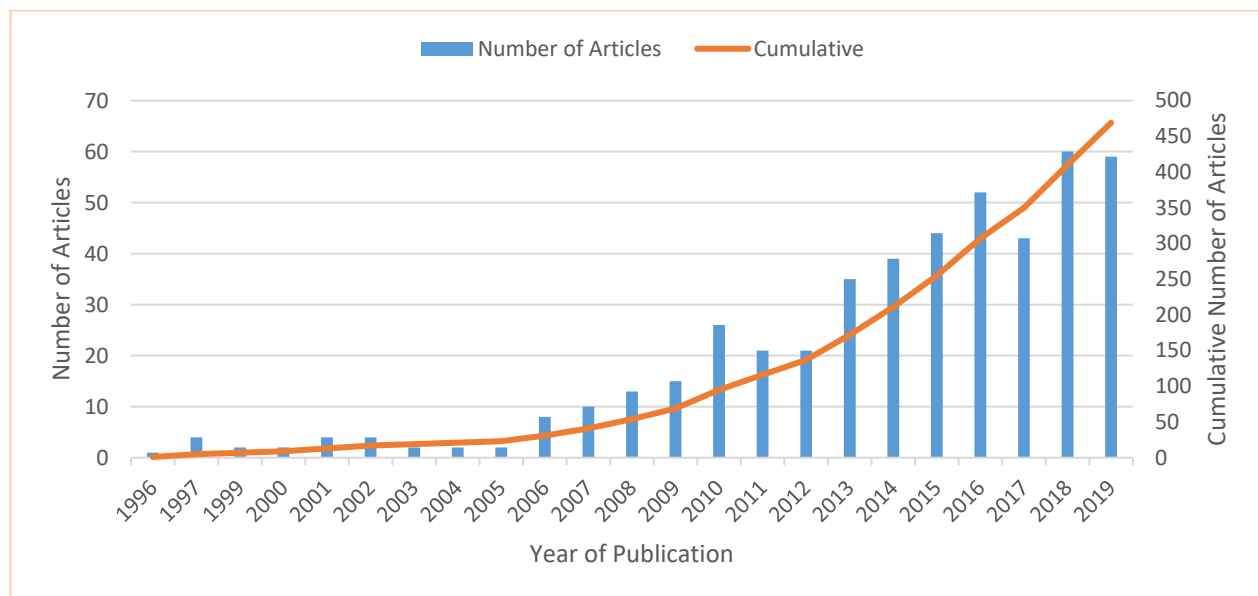


Figure 2: The annual and cumulative number of research articles on HRM-SCM in Scopus database from 1996 to 2019.

The areas of HRM-SCM research are widespread and numerous researchers worldwide are paying their increased attention in these areas. The analysis based on subject areas demonstrated that the prime focus of HRM-SCM studies was on business management fields which are evidenced by the total publications of 277 in business, management, and accounting areas. Other subject areas with their respective number of publications are: Engineering (154), Decision Sciences (103), Computer Science (81), Social Science (65), and others (66).

It was also shown in our results that the published articles in this research were in various languages. Majority of the researchers used English language in their publications constituting 453 articles with 96.6% followed by Chinese

(6; 1.3%), and Portuguese (3, 0.6%). Other languages (7; 1.5%) including Spanish, Croatian, French, Persian, and Ukrainian were used. It is noteworthy that when the authors submit their article in foreign language in Scopus indexed journals, English language should be used in the title as well as abstract of article.

3.2. Preferred journals

Our findings revealed that six different publishers owned the top ten productive journals (Table 1). Out of top ten publishers, Emerald published four journals followed by Elsevier publishing two journals. The remaining four journals were published by ExcelingTech Publishers, Taylor & Francis, Springer Nature, and IFAC Secretariat.

Table 1: The top 10 most productive journals on HRM-SCM research with their publisher and most cited article.

No.	Journal	TP (%)	TC	CiteScore 2018	The most cited article	Times cited	Publisher
1.	Journal Of Cleaner Production	19 (4.05%)	475	7.32	Green Human Resource Management and Green Supply Chain Management: Linking two emerging agendas	102	Elsevier
2.	International Journal Of Supply Chain Management	19 (4.05%)	24	0.63	Application of critical success factors in supply chain management	19	ExcelingTech Publishers
3.	International Journal Of Production Economics	10 (2.13%)	211	7.13	Cleaner supply-chain management practices for twenty-first-century organizational competitiveness: Practice-performance framework and research propositions	54	Elsevier
4.	International Journal Of Production Research	10 (2.13%)	263	4.34	Antecedents and enablers of supply chain agility and its effect on performance: A dynamic capabilities perspective	133	Taylor & Francis
5.	Industrial Management And Data Systems	9 (1.92%)	259	4.95	CPFR: An emerging supply chain tool	132	Emerald
6.	Journal Of Pharmaceutical Policy And Practice	8 (1.71%)	7	1.71	The Papua New Guinea medical supply system - documenting opportunities and challenges to meet the Millennium Development Goals	4	Springer Nature
7.	Supply Chain Management	7 (1.49%)	228	5.91	RFID technology adoption and supply chain performance: An empirical study in China's logistics industry	77	Emerald
8.	International Journal Of Physical Distribution And Logistics Management	6 (1.28%)	92	6.60	Human resource management implications of terrorist threats to firms in the supply chain	33	Emerald
9.	International Journal of Operations and Production Management	5 (1.07%)	166	6.05	A structural model of supply chain management on firm performance	100	Emerald
10.	IFAC-PapersOnLine	5 (1.07%)	6	0.99	Analysis of Team Situation Awareness Using Serious Game and Constructive Model-Based Simulation	3	IFAC Secretariat

TP: total publications; TC: total citations.

The journals with highest productivity was Journal of Cleaner Production and International Journal of Supply Chain Management with 19 articles each and both covered 4.05% of the total publications individually, followed by International Journal of Production Economics (10, 2.13%), International Journal of Production Research (10, 2.13%), Industrial Management And Data Systems (9, 1.92%). Despite, Journal of Cleaner Production received total 475 citations which is the highest in number, one of the article of International Journal of Production Research journal was the highest cited article (133 times cited).

CiteScore developed by Elsevier in 2016, assesses the citation impact of documents including journals, book series, conferences, and trade journals which Scopus database covers [19]. Referring to our study report of CiteScore 2018, five journals obtained the CiteScore of above 5. Interestingly, all of these journals were published by Elsevier and Emerald. While the Journal of Cleaner Production was reported as the highest CiteScore of 7.32, the International Journal of Supply Chain Management had the lowest CiteScore of 0.63.

3.3. Influential countries, international collaboration, and top-ranking institutions

Figure 3 demonstrates the ranking of 15 leading countries making contribution to the development of HRM-SCM research around the world. Majority of the contributions came from United States, United Kingdom, and India who acted as key players in publications and research progress in HRM-SCM. United States was the dominant country

publishing 110 articles in total 84 journals comprising 23.5% of the worldwide publications. Covering more than half of United States' total publications, United Kingdom ranked the next position of most productive country. Although the rank of Brazil was 8th in terms of global publications (TPc), the total publications from the academic institutions (TPi) of Brazil were 9 which is the highest among the listed 10 countries.



Figure 3: The 15 most productive countries along with academic institutions in HRM-SCM publications.

TPc: total publications of a given country; TPi: total publications of a given academic institution; SCP: single-country publications.

Amongst the 15 countries, 4 countries including India (75%), Iran (80.8%), Brazil (80%), and Indonesia (83.3%) had more than two-third of single-country publications (SCP) which implied that stated countries had strong collaboration within the country. In contrast, France was the country having the least SCP of 7.1%, where 13 out of 14 published articles had linkage with different affiliations from 18 countries.

Apart from Figure 3, we also provided the list of 40 most productive institutions focusing on how numerous HRM-SCM articles were published by these institutions which are depicted in Table S2 (Supplementary Material). The information provided in supplementary part included not merely academic but also non-academic institutions namely UNICEF.

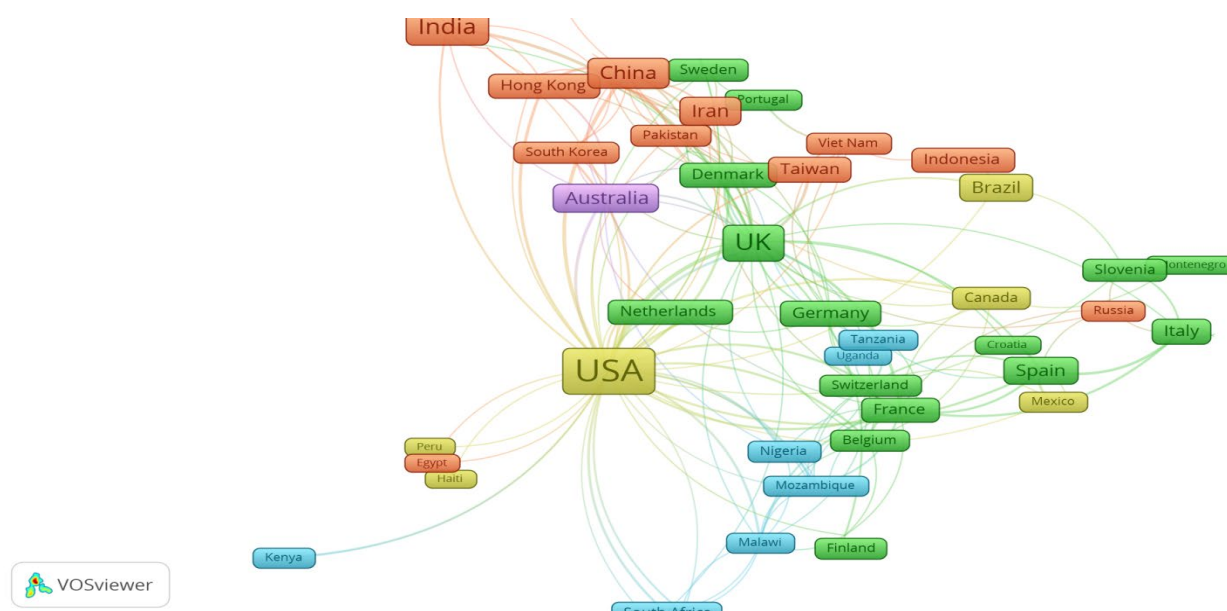


Figure 4. The presentation of bibliometric map on co-authorship created with network visualization mode. The URL used to open Figure 4 in VOSviewer is: <https://bit.ly/2MHQdhF>

Correspondingly, the distribution of territories or countries is displayed in Figure 4. The more two countries are closely located to one another in VOSviewer, the more strong relationship they have, similarly, the stronger link two countries have, the thicker line it will be. The division of countries based on the region highlighted that Asia became the highest region for having 31 countries and Europe scored the second position (30 countries), followed by Africa (16), America (8), and Oceania (1). It was shown in the results of co-authorship that the United States had the highest number of affiliations linking to 46 countries with the co-authorship of 94 times. The next countries with links and co-authorship were: United Kingdom (27 links, 55 co-authorships), France (18 links, 31 co-authorships), Malaysia (15 links, 19 co-authorships), Australia (14 links, 19 co-authorships), and others. Most notably, the results also pointed out that more than 85% of listed countries

collaboratively published with less than 10 countries. Additionally, researchers from 11 countries did not have any affiliation with other countries in order to publish articles on HRM-SCM.

3.4. Leading authors

As shown in Table 2, the list of 10 most prolific researchers in HRM-SCM is provided who were affiliated to seven countries such as France (3 authors), China (1 author), Slovenia (1 author), United Kingdom (3 authors), Italy (1 author), and United States (1 author). The range of first publication was from the year 1989 to 2014 where 8 authors had the first author role and 1 as a co-author. Even though no specific rules are applied in case of authorship sequence, seniority as well as supervisory role are normally related to the last position.

Table 2: List of the 10 most prolific authors in HRM-SCM research field.

No.	Author	Scopus author ID	Year of 1 st publication*	TP	h-index	TC	Current affiliation	Country
1.	De Sousa Jabbour, A.B.L.	54977014200	2009 ^a	6	5	238	Montpellier Business School, Montpellier	France
2.	Jabbour, C.J.C.	15757819200	2006 ^a	5	5	236	Montpellier Business School, Montpellier	France
3.	Huo, B.	24067029800	2005 ^a	4	3	58	Zhejiang University, Hangzhou	China
4.	Bogataj, M.	57131507900	1989 ^a	4	2	16	CERRISK-INRISK, Ljubljana	Slovenia
5.	Harrison, A.	57203174985	1995 ^a	3	3	62	Cranfield School of Management, Cranfield	United Kingdom
6.	Das, D.	23967845700	2007 ^a	3	3	30	University of Delhi, New Delhi	India
7.	Mangla, S.K.	55735821600	2012 ^a	3	2	12	University of Plymouth, Plymouth	United Kingdom
8.	Brown, A.N.	7408340861	1991 ^b	3	2	6	International Association of Public Health Logisticians (IAPHL), Arlington	United States
9.	Bogataj, D.	16444160900	Not mentioned	3	1	10	UniversitàdegliStudi di Padova, Padova	Italy
10.	Steele, P.	56963527300	2014 ^a	3	1	4	Pamela Steele Associates (PSA) Ltd, Oxford	United Kingdom

TP: total publications; TC: total citations.

* Role in co-authorship, superscripts.

^a First author.

^b Co-author.

De Sousa Jabbour, A.B.L. from the France scored the highest record of publishing 6 articles since 2009, and having total citations of 238. The second position in terms of publication was grabbed by Jabbour, C.J.C. who published 5 articles with 236 times citations. Surprisingly, both of them had h-index 5 and affiliation with Montpellier Business School, France. Only two authors were from Asia continent holding third and sixth position in publishing HRM-SCM articles. Apart from the authors' affiliation with academic institutions, certain non-academic institutions are also listed like Pamela Steele Associates (PSA) Ltd, United Kingdom.

3.5. Underpinning theories

In terms of underlying theories, we surprisingly found that 279 out of 469 articles did not mention or apply any theory, comprising 60% of total articles. The number and percentage of articles applying various theories in HRM-SCM research are shown in Figure 5. With reference to the application of theory, the resource-based view (RBV) was utilized frequently as the theoretical foundation of most papers, since RBV was found to be applied in 56 research articles. Afterwards, the institutional theory grabbed the attention of numerous scholars in the field of HRM-SCM and 9% of global publications used the institutional theory. Other theories applied in HRM-SCM domain included transaction cost theory (32 articles, 7%), stakeholder theory (28 articles, 6%), human capital theory (11 articles, 2%), agency theory (9 articles, 2%), network theory (6 articles, 1%), and system theory (4 articles, 1%).

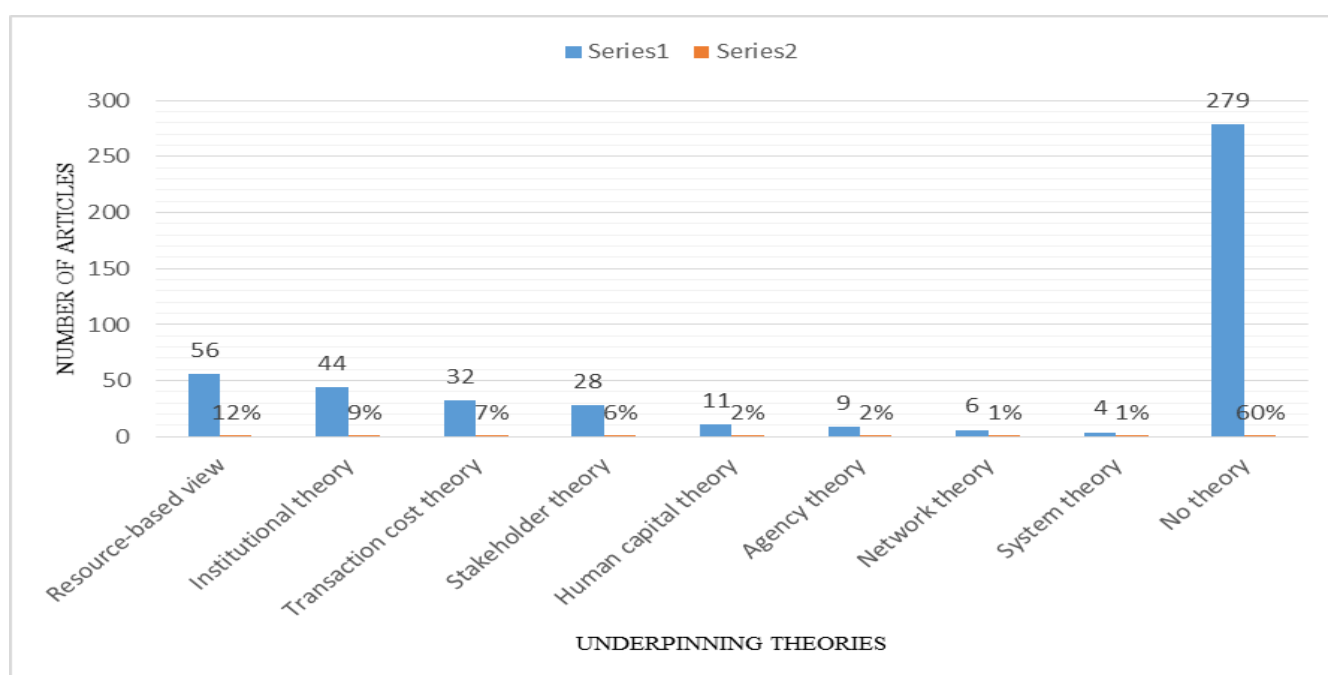


Figure 5: A number of key theories applied in research articles on HRM-SCM from 1996 to 2019.

3.6. The Analysis of Keywords of Research Hotspots on HRM-SCM Study

Keywords co-occurrence is able to effectively exhibit the research hotspots in various discipline fields by providing secondary support to conduct scientific research [20], [21]. VOSviewer is capable of visualizing the results of co-word in certain different types of co-word maps or displays. We selected the 'temporal display' that indicates three distinct features in HRM-SCM literature related topics. Initially, the size of nodes on the co-word map highlights the co-occurrence with relative frequency of various topics in HRM-SCM literature. Next, proximity and links in the co-citation map provide insight regarding the relationship within topics. Lastly, the colourful nodes on the co-word map reveal the relative recency pertaining to various topics since they are appeared in our reviewed articles. Such

temporal analysis is useful for identifying the emerging topics or what is termed in the literature as the "research front" [22].

The same analysis of co-occurrence of keywords could be applied for identifying the research front with regard to topical trends in HRM-SCM research. Instead of using the network map to view the coloured clusters, VOSviewer could display the overlay visualization focusing on the average publication year of articles related to particular keywords. In fact, overlay visualisation is appropriate for analysing the co-occurrence of keywords by informing the recent topical trends [16]. The blue colour represents older topics, while recent topics are represented by yellow colour. This method is effective for identifying trends of topics by considering the size of the node together with link strength.

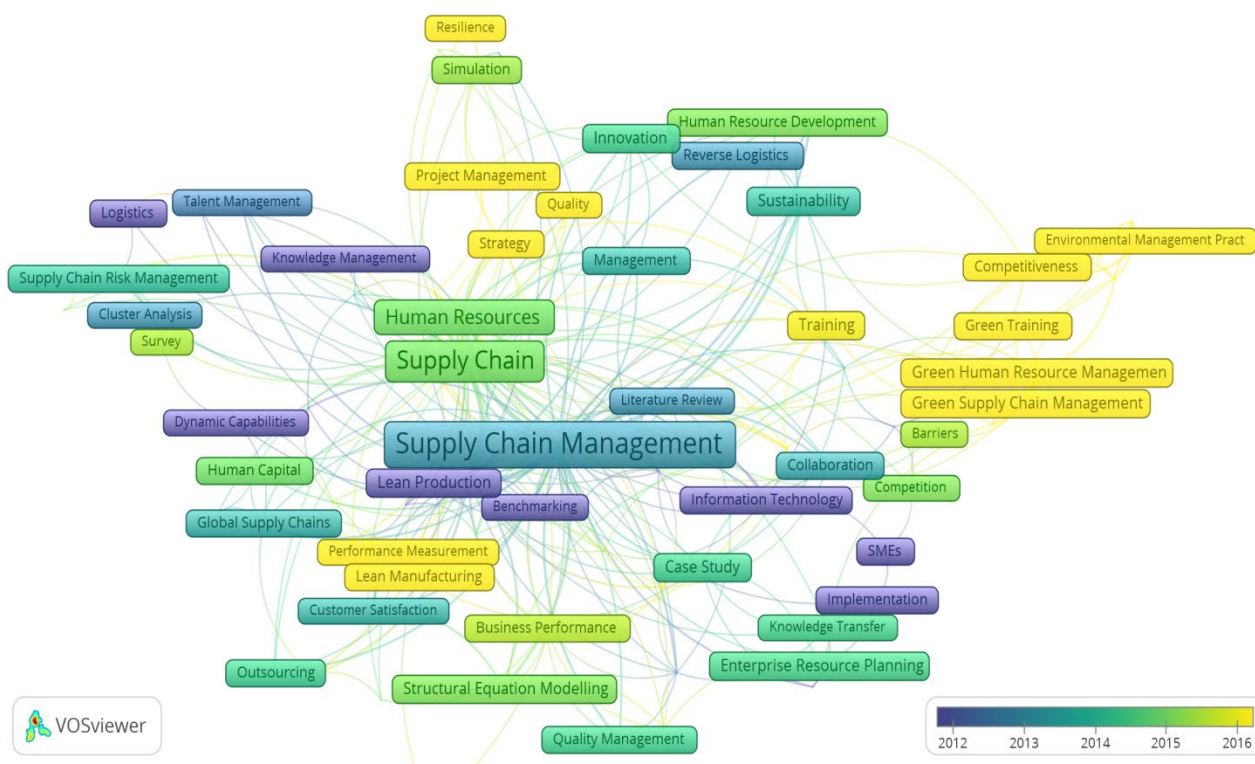


Figure 6: A bibliometric map highlighting the co-occurrence of author keywords with overlay visualization mode is put in screenshot and the map of Figure 5 can be opened through the following URL in VOSviewer: <https://bit.ly/2qOkraqS>.

The two key concepts of this study are Human Resource Management and Supply Chain Management, which are also apparent in our study results showing that “Supply Chain management” was encountered most frequently with 93 occurrences and 51 links to other different keywords (see Figure 6). Furthermore, “Human Resource Management” was appeared with 45 occurrences and 36 links. Our findings also included several frequent general terms like Supply Chain (54 occurrences, 46 links), Human Resources (28 occurrences, 25 links), Innovation (11 occurrences, 10 links), Sustainability (11 occurrences, 10 links).

The recorded number of author keywords was of total 896, among which 11 keywords (73.7%) were applied only once, 25 (12.1%) were applied twice, and 28 (4.3%) were applied thrice. After the re-label of synonymous words and also the de-selection of irrelevant keywords, the minimum number of occurrences was set at 3 which in turn produced 86 keywords for our VOSviewer mapping. As indicated by the size of the nodes appeared on the co-word map, the keywords with the most frequent co-occurrence were ‘Supply Chain Management’ (93 cases), ‘Supply Chain’ (54 cases), ‘Human Resources Management’ (45 cases), ‘Human Resources’ (28 cases), ‘Innovation’ (11 cases), ‘Sustainability’ (11 cases), ‘Green Supply Chain Management’ (10 cases), ‘Performance’ (10 cases), and ‘Supply Chain Integration’ (9 cases).

The link strength within two nodes defines the co-occurrence frequency [21]. It could also be utilized as a quantitative index for depicting the correlation between the nodes [23]. A node’s total link strength incorporates the

sum of link strengths of that node with all other nodes. In the VOSviewer map, the thicker the line between two nodes has, the stronger the link is represented. Thus, the node “Supply Chain Management” has thicker lines with “Human Resources Management” (13), “Human Resources” (9), “Sustainability” (5), “Structural Equation Modelling” (5), “Training” (3), “Critical Success Factors” (3), and “Social Responsibility” (3). These nodes are found to have strong link with Supply Chain Management. The relationships of “Supply Chain Management” with “Human Resources Management” as well as “Sustainability” signal the close association of Supply Chain Management with Sustainable Human Resources Management.

4. Discussion

This study adopted a bibliometric procedure with the objective of reviewing scientifically the field of HRM and SCM. This section points out limitations of the methodology together with the interpretation of this study’s findings.

4.1. Limitations

Like all studies, our review is not without any limitation. The first limitation includes that we conducted the literature search solely from the Scopus database. Although this database comprehensively covers scholarly contributions in business and management since 1996, there is the possibility of omitting certain relevant study on our topic. This limitation was mitigated partially through using co-citation analysis that comprises all documents in the

reference section of 469 articles which we analysed, thereby allowing us to encompass a broader segment of HRM-SCM literature than only focusing on 469 articles from our database. Against this backdrop, future researchers are recommended to make comparison the results from several databases namely Scopus as well as Web of Sciences (WoS). The WoS has the feature of automatically displaying the most popular articles which may be termed as 'hot paper' and Scopus lacks this feature. These key articles are recognized based on the increased number of citations. Apparently, conducting a bibliometric review applying multiple databases would be beneficial for a more wide-ranging study.

The next limitation pertaining to this review involves the application of science mapping. Bibliometric analysis is conceptualised as portraying the evolution and emerging intellectual structure of HRM-SCM literature. This nature of analysis does not deeply delve into specific findings from HRM-SCM studies. Therefore, our paper contributes here by paving the way for future analyses of study findings based on HRM-SCM research.

4.2. Interpretation and Implications of the Findings

The present research review applied bibliometric analysis for enhancing our understanding regarding the knowledge base in HRM and SCM field. This review employed science mapping of 469 Scopus-indexed articles with a view to gaining insights into the growth of research on HRM-SCM domain. It is worth noting that bibliometric analysis neither investigate the quality of particular studies, nor seek to summarize substantive findings from scholarly literature. Instead, this analysis aims at documenting the intellectual structure and composition of the knowledge base which has evolved with the passage of time [24]. Therefore, the purpose of bibliometric analysis is to highlight productive directions for future researchers.

The first research objective focused on the growth trajectory, volume, and distribution patterns of scholarship on HRM-SCM field. Our findings included that the area of HRM-SCM is beginning to gain popularity in mainstream research journals. The advancing growth trajectory of HRM-SCM studies suggests that this field is emerging and gained significant attention in the current decade. The second objective indicated focusing on the analysis of keywords of research hotspots on HRM-SCM research. Keywords co-occurrence is able to effectively exhibit the research hotspots in various disciplines by providing secondary support to conduct scientific research [20] [21]. Our study analysed keyword co-occurrence confirming that "Supply Chain Management", "Supply Chain", and "Human Resources Management" were the most frequently co-occurring keywords. Next, proximity and links in the co-citation map provide insight regarding the relationship within topics [16]. By applying the VOSviewer map, we found that thick line between two nodes represents strong link. Thus, the node "Supply Chain Management" was found to have the strongest link with "Human Resources Management", "Human Resources", "Sustainability".

The next research objective highlighted demonstrating the prolific authors' contributions, most productive institutions, and the leading countries. Our analysis indicated that prolific authors from Europe (Jabbour, A.B.L., Jabbour, C.J.C., Bogataj, M., Harrison, Mangla, Bogataj, D., Steele) and Asia (Huo, Das) dominated the research field of HRM-SCM. The authors' leadership in this field reveals not merely broader patterns of scholarly literature but also the growth of citation impact. With respect to regional distribution of HRM-SCM publications, the United States, the United Kingdom, and India were the top contributors in this field. Although these countries had the highest contributions, productive academic institutions from Brazil, Iran, Australia, and Malaysia were the top scorer in publishing HRM-SCM research. In terms of preferred journals, Journal of Cleaner Production, International Journal of Production Economics, and International Journal of Supply Chain Management were the top productive journals published by Elsevier and ExcelingTech Publishers respectively, while the most cited articles [25], [26], and [27] came from the journal of International Journal of Production Research, Industrial Management And Data Systems, and Journal of Cleaner Production respectively.

The fourth research objective pointed out identifying the underpinning theories applied in HRM-SCM research. Data presented in this study indicated that the resource-based view (RBV) and the institutional theory were utilized frequently as the theoretical foundation of most papers in the field of HRM-SCM. Despite other theories were applied in HRM-SCM research, no theory was applied in majority of the articles comprising 60% of all published articles. The final research objective emphasized providing in-depth understanding of potential collaborations as well as future directions. The distribution of countries in VOSviewer map indicated that Asia became the highest region and Europe scored the second position in terms of collaboration in publications. It should be noted that United States had the highest number of affiliations for publishing HRM-SCM research. The benefits regarding international collaboration lie in sharing expertise, exchanging knowledge, and broadening network on one hand, and a fruitful strategy for uplifting the rank on the other.

5. Conclusion

Since both HRM and SCM are gaining significant momentum in their research areas, a number of previous researchers [1], [28] attempted to conduct reviews on these two knowledge domain. However, none, upto recently, applied the method of bibliometric review to this issue. Taking the gap into consideration, this study investigated the evolution of scientific literature in HRM-SCM from the period of 1996 to 2019, based on the published documents in the Scopus database. With regard to the number of citations, the HRM-SCM domain can be considered as interdisciplinary and an increasing trend is witnessed in case of the number of published articles. Considering the top productive journals, Journal of Cleaner Production, International Journal of Supply Chain Management were the top two journals in the HRM-SCM area. We found De Sousa Jabbour, A.B.L. from France as the most prolific

author and UNESP-Universidade Estadual Paulista as the most productive academic institution in HRM-SCM research field.

Our study makes several contributions to the HRM-SCM literatures. Initially, being the first attempt to carry out a comprehensive review on HRM-SCM domain, this study contributes to the extant literature by mapping a systematic conceptual structure along with employing bibliometric technique. Second, we place emphasis on the neglected field of research as documenting the evolution and assessing the current status of HRM-SCM knowledge base are missing to a great extent. Third, our study opens the door of opportunity for future scholars by positioning their study in this emerging field and also allows them for identifying new research avenues. It is our hope that this review will also provide requisite direction to the new generation of HRM-SCM researchers across the world to quickly capture the intellectual structure of the field so that this growing knowledge base can 'find its feet' promptly.

References

- [1] N.-O. Hohenstein, E. Feisel, and E. Hartmann, "Human resource management issues in supply chain management research: a systematic literature review from 1998 to 2014," *Int. J. Phys. Distrib. Logist. Manag.*, vol. 44, no. 6, pp. 434–463, 2014.
- [2] M. Gómez-Cedeño, J. M. Castán-Farrero, L. Guitart-Tarrés, and J. Matute-Vallejo, "Impact of human resources on supply chain management and performance," *Ind. Manag. Data Syst.*, vol. 115, no. 1, pp. 129–157, 2015.
- [3] E. Sweeney, "The people dimension in logistics and supply chain management—its role and importance," in *Supply Chain Management: Perspectives, Issues and Cases*, R. Passaro and A. Thomas, Eds. McGraw-Hill, Milan, 2013, pp. 73–82.
- [4] B. Huo, Y. Ye, X. Zhao, and Y. Shou, "The impact of human capital on supply chain integration and competitive performance," *Int. J. Prod. Econ.*, vol. 178, pp. 132–143, 2016.
- [5] A. E. Ellinger and A. D. Ellinger, "Leveraging human resource development expertise to improve supply chain managers' skills and competencies," *Eur. J. Train. Dev.*, vol. 38, no. 1/2, pp. 118–135, 2014.
- [6] K. Mahroof, "A human-centric perspective exploring the readiness towards smart warehousing: The case of a large retail distribution warehouse," *Int. J. Inf. Manage.*, vol. 45, pp. 176–190, 2019.
- [7] H. Stadler, "Supply chain management: An overview," in *Supply chain management and advanced planning*, Berlin, Heidelberg: Springer Publishing, 2015, pp. 3–28.
- [8] C. W. Autry and J. M. Whipple, "Special issue on sustainability and resource scarcity," *Int. J. Phys. Distrib. Logist. Manag.*, vol. 43, no. 5/6, pp. 348–350, 2013.
- [9] M. Kasonde and P. Steele, "The people factor: An analysis of the human resources landscape for immunization supply chain management," *Vaccine*, vol. 35, no. 17, pp. 2134–2140, 2017.
- [10] K. S. Yogi and H. Kotzab, "The intellectual foundation of supply chain management performance models: a bibliometric analysis and synthesis," *Int. J. Comp. Manag.*, vol. 2, no. 1, pp. 67–91, 2019.
- [11] D. Mishra, A. Gunasekaran, T. Papadopoulos, and R. Dubey, "Supply chain performance measures and metrics: a bibliometric study," *Benchmarking An Int. J.*, vol. 25, no. 3, pp. 932–967, 2018.
- [12] Y. Ye, "A Bibliometric Analysis of Supply Chain Management Research from the Perspective of Social Network," *Sci. Technol. Libr.*, vol. 38, no. 2, pp. 1–19, 2019.
- [13] J. M. Khudzari, J. Kurian, B. Tartakovsky, and G. S. V. Raghavan, "Bibliometric analysis of global research trends on microbial fuel cells using Scopus database," *Biochem. Eng. J.*, vol. 136, no. 1, pp. 51–60, 2018.
- [14] C. Yoopetch and S. Nimsai, "Science mapping the knowledge base on sustainable tourism development, 1990–2018," *Sustainability*, vol. 11, no. 13, p. 3631, 2019.
- [15] F. García-Lillo, M. Úbeda-García, and B. Marco-Lajara, "The intellectual structure of human resource management research: A bibliometric study of the International Journal of Human Resource Management, 2000–2012," *Int. J. Hum. Resour. Manag.*, vol. 28, no. 13, pp. 1786–1815, 2017.
- [16] P. Sanguankaew and V. V. Ractham, "Bibliometric Review of Research on Knowledge Management and Sustainability, 1994–2018," *Sustainability*, vol. 11, no. 16, p. 4388, 2019.
- [17] N. J. van Eck and L. Waltman, "Software survey: VOSviewer, a computer program for bibliometric mapping," *Scientometrics*, vol. 84, no. 2, pp. 523–538, 2009.
- [18] N. J. van Eck and L. Waltman, *VOSviewer Manual: Manual for VOSviewer Version 1.6. 8*. Leiden: CWTS, 2018.
- [19] L. I. Meho, "Using Scopus's CiteScore for assessing the quality of computer science conferences," *J. Informetr.*, vol. 13, no. 1, pp. 419–433, 2019.
- [20] H. Li, H. An, Y. Wang, J. Huang, and X. Gao, "Evolutionary features of academic articles co-keyword network and keywords co-occurrence network: Based on two-mode affiliation network," *Phys. A Stat. Mech. its Appl.*, vol. 450, no. 1, pp. 657–669, 2016.
- [21] H. Liao, M. Tang, L. Luo, C. Li, F. Chiclana, and X.-J. Zeng, "A bibliometric analysis and visualization of medical big data research," *Sustainability*, vol. 10, no. 1, p. 166, 2018.
- [22] A. Kainzbauer and P. Rungruang, "Science Mapping the Knowledge Base on Sustainable Human Resource Management, 1982–2019," *Sustainability*, vol. 11, no. 14, p. 3938, 2019.
- [23] M. Pinto, A. Pulgarín, and M. I. Escalona, "Viewing information literacy concepts: a comparison of two branches of knowledge," *Scientometrics*, vol. 98, no. 3, pp. 2311–2329, 2014.
- [24] S. Zaby, "Science Mapping of the Global Knowledge Base on Microfinance: Influential Authors and Documents, 1989 – 2019," 2019.
- [25] C. Blome, T. Schoenherr, and D. Rexhausen,

“Antecedents and enablers of supply chain agility and its effect on performance: a dynamic capabilities perspective,” *Int. J. Prod. Res.*, vol. 51, no. 4, pp. 1295–1318, 2013.

- [26] G. Fliedner, “CPFR: an emerging supply chain tool,” *Ind. Manag. data Syst.*, vol. 103, no. 1, pp. 14–21, 2003.
- [27] C. J. C. Jabbour and A. B. L. de Sousa Jabbour, “Green human resource management and green supply chain management: Linking two emerging agendas,” *J. Clean. Prod.*, vol. 112, no. 3, pp. 1824–1833, 2016.
- [28] M. L. Lengnick-Hall, C. A. Lengnick-Hall, and C. M. Rigsbee, “Strategic human resource management and supply chain orientation,” *Hum. Resour. Manag. Rev.*, vol. 23, no. 4, pp. 366–377, 2013.