

Knowledge Map of Human Resource Management: A Visual Analysis Using CiteSpace

Zhaojun Du

Email: 119272405@qq.com

School of Management, Guangdong University of Finance and Economics, Guangzhou, China

Abstract. Human resource management has always been an important field. However, there remains a lack of systematic and scientific research. In this study, CiteSpace is used to carry out bibliometric analysis and visualization research on the Web of Science core collection database, intended to provide guidance for future research. Through cited reference analysis, co-occurrence keywords and keywords with citation bursts, this study vividly shows the fruitful achievements in recent years. This paper clarifies the high-yield authors, classic literature and hot spots, which reveals the characteristics and academic frontiers of this field.

Keywords: Human resource management, Knowledge map, CiteSpace

1 INTRODUCTION

The term "human resources" was first proposed by a management expert named Peter Drucker in his book "the practice of management". For a country, human resources are the necessary to achieve national prosperity; for an enterprise, human resources are valuable to achieve organizational goals and win market competition. How to reasonably allocate and make full use of human resources has always been the concern. In the post-epidemic era, the environment is becoming more and more complicated and changeable, making human resource management face more challenges. Therefore, scholars at home and abroad have carried out multitudes of theoretical research and practical exploration in the field of human resource management. Although scholars have scientifically analyzed and summarized the research results, there is few studies from the perspective of bibliometrics. In order to deeply understand and master the hot spots and frontiers in the field of human resource management in the world, based on the principles of bibliometrics, this paper uses CiteSpace to perform statistical and quantitative analysis on literature from 2012 to 2021. It visually shows the research foundation and frontiers of the field of human resource management, which will give some references to scholars and provide direction for future research.

2 RESEARCH METHODS AND DATA SOURCES

In this paper, CiteSpace is used to draw visualization maps of scientific knowledge and analyze the data. The specific analysis methods are as follows: first, focused on a statistical analysis of the annual distribution and authors of sample literature of human resource management in recent 10 years, this study summarizes the research status; second, it finds the valuable

literature through the co-citation analysis; third, through co-occurrence keyword analysis, it detects the hot points in this field; finally, it picks out the trends through keywords with citation bursts.

In order to ensure the quality and reliability of the sample, literature was retrieved online through the Social Sciences Citation Index version of the Web of Science Core Collection (WoSCC). The time span was from 2012 to 2021. The following terms were searched for in the Topic: ("human resource management" OR "hrm") AND Language = English. In this paper, all the documents with no author or irrelevant to the subject were screened out, so as to eliminate irrelevant references. In addition, book chapters, editorial material and proceeding papers were removed, and finally 1487 samples were obtained.

3 RESULTS

3.1 Analysis of Publication Years

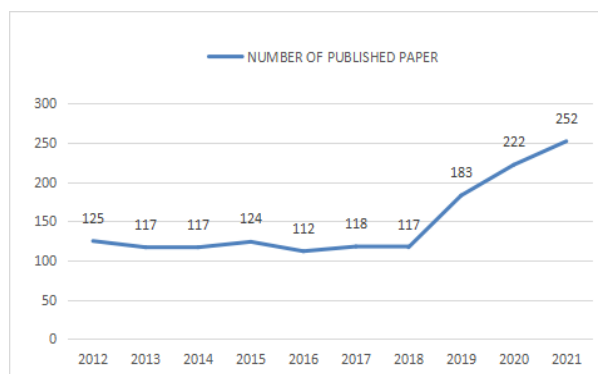


Fig. 1. Annual trend chart of publications.

Based on the collation of sample documents in the field of human resource management from 2012 to 2021, this study uses Excel software to process data and obtain the annual distribution map, as shown in figure 1.

As we can see, since 2012, the number of publications in the field of human resource management has generally shown an upward trend. This study divides it into two stages.

The first stage: 2012-2018. The number of published papers at this stage remained stable, probably because research of this field has reached a mature stage. The research results had been fruitful, so it was difficult to study human resource management from a new perspective. Though the growth of publications was slow, the quantity was good, which showed that this field still possessed academic value.

The second stage: 2019-2021. The number of publications at this stage had risen sharply. In particular, there was rapid growth in 2019, indicating that this field received increased attention in 2019. Recently, compared with industry economy time, new generation of information and technologies such as big data, artificial intelligence and 5G has become a strong driving force for human resource management in the new era. The outbreak of the epidemic has also

brought new challenges to this field. Therefore, the research has been heating up and will be of high value in the future.

3.2 Analysis of Core Author

The number of published papers can represent the degree of attention and research depth of the author in this area. As shown in table 1, the top 5 authors by the quantity of articles are listed. The most prolific author is BREWSTER C, who has published 11 papers and contributed a lot to this field.

Table 1. The top 5 authors of human resource management.

Rank	Count of articles	Author
1	11	BREWSTER C
2	10	BARTRAM T
3	10	BONDAROUK T
4	6	LOPEZ-FERNANDEZ M
5	5	PEREIRA V

3.3 Analysis of Co-cited References

In order to intuitively observe the basic literature which has got much attention, this paper conducts literature co-citation analysis on the downloaded data. Finally it obtains a knowledge map, as shown in figure 2.

As we can see, the network in figure 2 consists of 212 nodes and 213 connections, and each node represents a document.

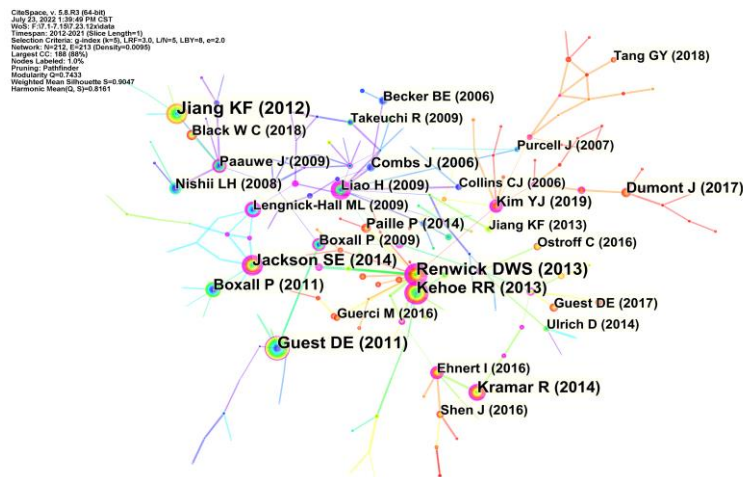


Fig. 2. The network of co-cited references.

The authors whose literature has received high attention are ranked, as shown in table 2.

Table 2. The top 5 co-cited references sorted by the number of citations.

Rank	Co-cited reference	Count	Centrality
1	Jiang KF, 2012, How Does Human Resource Management Influence Organizational Outcomes? A Meta-analytic Investigation of Mediating Mechanisms [4]	126	0.07
2	Renwick DWS, 2013, Green Human Resource Management: A Review and Research Agenda [8]	111	0.75
3	Guest DE, 2011, Human resource management and performance: still searching for some answers [3]	97	0.18
4	Kehoe RR, 2013, The Impact of High-Performance Human Resource Practices on Employees' Attitudes and Behaviors [6]	79	0.21
5	Jackson SE, 2014, An Aspirational Framework for Strategic Human Resource Management [5]	79	0.58

Figure 2 and table 2 directly show the frequently cited literature related to human resource management.

The first co-cited reference was an article written by Jiang KF (Jiang 2012). Drawing on the Ability-Motivation-Opportunity model [4], this study found that the three dimensions were related to financial outcomes both directly and indirectly by influencing human capital and employee motivation as well as voluntary turnover and operational outcomes in sequence. This meta-analytical investigation had a far-reaching effect on human resource management.

The second co-cited reference was published by Renwick DWS (Renwick 2013), which made a case for the integration of the large separate texts of environmental management and human resource management research. Based on Ability-Motivation- Opportunity theory, this paper summarized the existing literature and revealed the role that Green human resource management played in people-management practice [8].

From the perspective of betweenness centrality, literature of HUSELID, PODSAKOFF, HOFETEDE, WRIGHT and DELERY has strong betweenness centrality. This shows that their articles play an important role as a link and bridge in the field of human resource management research. It also indicates that their research results have a strong impact.

3.4 Analysis of Co-occurring Keywords

Keywords are usually words that appear frequently in an essay and can represent core issues. Through analysis of co-occurring keywords, we can find hot issues of human resource management in different periods. Figure 3 shows the keywords network.

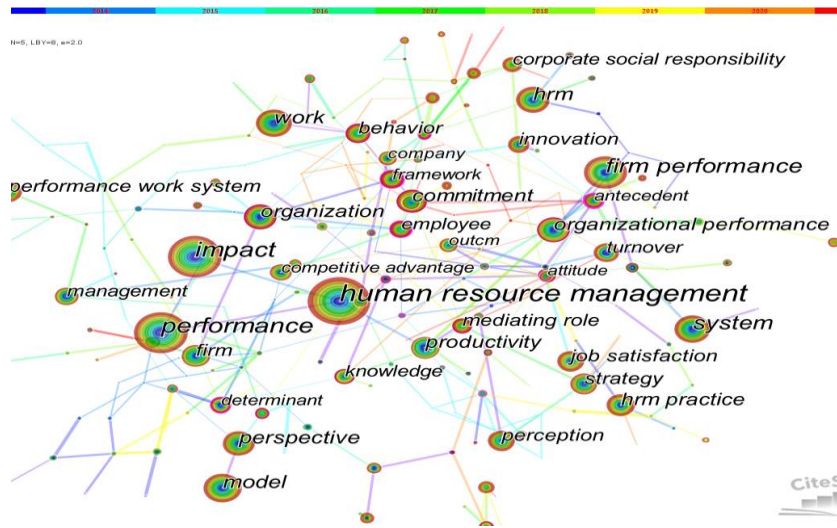


Fig. 3. The network map of keywords.

According to figure 3, we sort out the top 20 high-frequency keywords, and make a list of keywords with their centrality, as shown in table 3.

Table 3. The top 20 keywords of human resource management with their centrality.

Rank	Keyword	Count	Centrality	Rank	Keyword	Count	Centrality
1	human resource management	553	0.07	11	organizational performance	102	0.16
2	performance	354	0.04	12	organization	99	0.11
3	impact	328	0	13	commitment	98	0.13
4	firm performance	207	0.07	14	productivity	96	0.13
5	system	171	0.02	15	job satisfaction	88	0
6	hrm	132	0.07	16	performance work system	86	0.06
7	model	131	0	17	strategy	85	0.05
8	work	124	0.02	18	firm	81	0.08
9	perspective	116	0.06	19	perception	79	0.03
10	hrm practice	109	0.04	20	behavior	77	0.16

The data network in figure 3 consists of 222 nodes and 297 connections. Each node represents a keyword, and the color of the node corresponds to the color of the timeline, representing the year when this keyword was first proposed.

Generally speaking, the measurement indicators of the importance of keywords include frequency and centrality. The frequency of keywords is positively correlated with the degree of attention. The higher the frequency, the higher the degree of attention, that is, the more im-

portant; if the centrality is not less than 0.1, the keywords have a large centrality, indicating that they play a role of bridge and link connecting other keywords in the network map. Next, we will analyze several important keywords in this field.

First, according to table 3 and figure 3, it can be found that the keyword with the highest co-occurring frequency is "human resource management", with a total of 553 times and a centrality of 0.07. Another keyword "hrm", with a total of 132 times and a centrality of 0.07, represents "human resource management". "human resource management" is still the most significant research hot spot in this field in the past decade. For example, Brewster C (Brewster 2013) studied on human resource management in the UK and Finland [1].

In addition, the co-occurrence frequency of "Performance" is also high, a total of 345 times, and the centrality is 0.04. At the same time, the chart shows that the keywords such as "firm performance" with a total of 207 times and a centrality of 0.07 and "organizational performance" with a total of 102 times and a centrality of 0.16 also have a high co-occurrence frequency and strong centrality. The centrality of them is high, indicating that they have strong influence on human resource management research. For example, Milfelner B (Milfelner 2014) demonstrated the influence of SR and HRM on organizational performance from aspects of growth [7], development and finances empirically.

Finally, we can see that "antecedent" with the highest centrality, as a turning point, connects a series of high frequency or high centrality nodes such as "innovation", "commitment" and "attitude". At the same time, key nodes such as "organization", "productivity" and "perspective" are also the hot spots in recent years.

3.5 Analysis of Keywords with Citation Bursts

Keywords with citation bursts are keywords that grow rapidly in a certain period of time. This method is used to understand the hot spots and predict the trend in a certain field. We can see the duration and evolution tendency of the hot areas in human resource management according to figure 4.

Top 15 Keywords with the Strongest Citation Bursts

Keywords	Year	Strength	Begin	End	2012 - 2021
productivity	2012	10.99	2012	2015	
turnover	2012	5.86	2012	2013	
measurement error	2012	4.32	2012	2013	
network	2012	4.06	2012	2014	
view	2012	3.98	2012	2013	
china	2012	3.84	2012	2014	
manufacturing performance	2012	3.39	2012	2013	
power	2012	4.44	2014	2016	
support	2012	4.92	2015	2016	
value creation	2012	3.96	2016	2019	
organizational ambidexterity	2012	3.66	2016	2019	
burnout	2012	3.66	2016	2019	
job demand	2012	3.43	2017	2021	
responsibility	2012	3.46	2018	2019	
sustainable human resource management	2012	4.05	2019	2021	

Fig. 4. Top 15 keywords with the strongest citation bursts.

Figure 4 shows the top 15 keywords with the strongest citation bursts from 2012 to 2021. The keyword "productivity" first appeared in 2012 and persisted until 2015, with the highest emergence coefficient. It reflects the sudden turn of research in this field. We speculate that with the development of economy, the market competition situation is more intense. A high-quality talent team is demanded to win in the fierce competition. Only by strengthening the optimization of human resource management and improving labor productivity can enterprises create more value. For example, though hr practices in isolation may increase or reduce productivity because they have an efficient side to them, Cozzarin, BP (Cozzarin 2014) demonstrated that when aggregated, hr practices reduce productivity in Canada [2].

Moreover, the keywords "job demand" and "sustainable human resource management", appeared in 2017 and 2019, and persisted until 2021. According to the trend forecast, it will continue to exist in the future. This also echoes today's business environment. At present, every enterprise is under the pressure of controlling expenditure and verifying results. Competition among enterprises is ultimately the competition of talents. It requires the sustainable development of human resource management. Job requirements are the tasks that organizations give employees to complete and the engine of work behavior. They are also closely related to human resource management. These new hot keywords indicate that these related topics have received relatively high attention. Scholars can enrich research and innovation from these aspects.

4 CONCLUSION

This is a study to review the research status of human resource management and reveal the hot spots and frontiers through CiteSpace. A total of 1487 publications related to human resource management were acquired from the WoSCC, from 2012 to 2021. This paper conducts annual distribution analysis, author analysis, analysis of co-citation literature, analysis of co-occurring keywords and analysis of keywords with citation bursts, hoping to provide some meaningful guidance for the later research. The following conclusions can be drawn:

First, studies on human resource management can be divided into two distinct stages: 2012-2018 is a flat period; 2019-2021 is a period of rapid growth.

Second, scholars have contributed a lot to this field and there are already research societies with close cooperative relations.

Third, through analysis of co-citation literature, we can intuitively observe the basic literature that has received much attention in recent years.

Fourth, through analysis of co-occurring keywords, it is found that the human resource management focuses on "human resource management", "performance" and other words.

In addition, through analysis of keywords with citation bursts, "job demand" and "sustainable human resource management" still have a high research interest. Scholars of this field can continue to conduct in-depth research in the future.

The deficiency of this paper is that there is no comparative analysis with domestic research on human resource management, so the understanding of the research results of this field is not enough.

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