Visual Analysis of Human Resource Management with Big Data Research

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Abstract. This paper mainly uses the visualization software Citespace to visually analyze 1783 literature data on human resource management with big data research collected by CNKI journals from 2013 to 2022. The analysis of research fields and research hotspots has drawn the development status of domestic human resource management with big data research. At the same time, various data analysis shows that while domestic human resource management with big data research are developing steadily, there are still some problems in the research area of human resource management with big data such as imperfect and unbalanced research models, and lack of quantitative analysis. This paper will make recommendations that have helped future research address these issues.

Keywords: Human Resource Management · Big Data · Visual Analysis

1 Introduction

Since 2020, the outbreak and normalization of the epidemic have caused tremendous changes in the rhythm of people's lives and work. This is not only a test for individuals, but also a major test for organizations that are very important in society, that is enterprises. In an environment of increasing external uncertainty and challenges, the human resource management of enterprises is becoming more and more important, while traditional human resource management systems only focus on daily transactional work, resulting in low efficiency and interrelationships with enterprises. Such human resource management obviously cannot match the development strategy of the enterprise in a complex environment and cannot effectively support the long-term development of the enterprise. Therefore, the traditional human resource management needs innovation and transformation [2]. As an important discipline, human resource management is closely related to the changes of social and economic environment. Especially in the evolution and development of the past 40 years, entrepreneurs and managers have paid more and more attention to the role of human resource management, and it has gradually become a focus of attention of scholars in the field of academic research [9]. In recent years, the academic research field has made great achievements in the research of human resource management innovation, such as combining human resource management with research in different fields such as artificial intelligence and big data. In this paper, the research

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of human resource management with big data is visualized and analyzed to find out the hot topics, so as to provide research directions for relevant researchers, and also provide suggestions for the innovation of human resource management.

2 Research Tools and Data Sources

The main research tool in this paper is the Citespace developed by Dr. Chaomei Chen from Drexel University, USA. Citespace is an information visualization software. It can be used to measure the collection of documents in a specific field to find out the key path of the evolution of the subject field and draw a series of visual maps to form an analysis of the evolution and the development of the subject [1].

This paper uses human resource management and big data as the keywords to search in the Chinese Academic Journals Network Publishing Database (CNKI), screen the search results, select only the journal literature and retrieve a total of 1783 journal literature. It constitutes the literature sample data of this study, and then the obtained data is exported in txt file format and processed with a file naming method recognizable by Citespace. The earliest literature start time obtained from the search results is 2013 [5]. Thus, the time span of this study is determined as 2013 to 2022.

3 Data Analysis

3.1 Number of Articles Published

The number of articles in related fields published in a certain period of time reveals the development characteristics of this research field to a certain extent. By importing the retrieved 1783 literature data into Excel, the annual publication volume can be quickly located and the trend of human resource management with big data research from 2013 to 2022 can be deduced by drawing a graph. According to the fluctuation trend of annual publication volume shown in Fig. 1, the relevant research can be divided into three stages. From 2013 to 2019 is the initial stage, and the number of published papers shows a trend of increasing year by year. From 2019 to 2020, it is a slow stage, the number of publications has decreased compared with the peak, and the research enthusiasm has decreased. Starting from 2021, the rising stage has resumed, and the number of published articles has once again stepped out of the upward trend.

It can be seen that before 2017, the number of published papers in the fields of human resource management with big data research was less than 200, but in 2019, the number of published papers has exceeded 400 which was more than double that in 2017 and shows that related fields have received widespread attention from scholars.

3.2 Researcher

The data we collected from CNKI shows that there are few connections between authors that indicating a lack of cooperation among researchers. And the data of the top 14 authors by the number of published papers were exhibited in Table 1. Among them, the relevant research literature published by Liu Jing is at most 4, but the number of authors

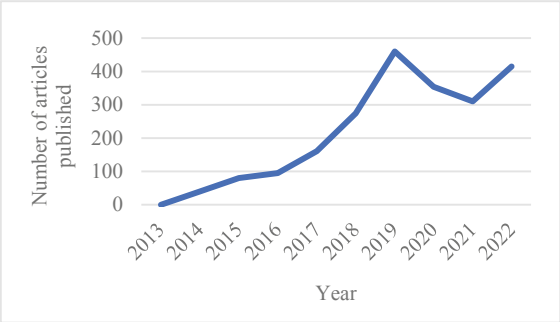

Fig. 1. Annual publication articles trend

Table 1. Author's publications top 14

Serial Number	Author	Year of Initial Release	Number of Articles Published
1	Liu Jing	2017	4
2	Zhang Min	2019	3
3	Liu Jia	2015	3
4	Li Ying	2016	3
5	Sun Xiaomei	2020	3
6	Kang Yuqi	2015	3
7	Pan Xiaoli	2019	2
8	Zhang Yingying	2018	2
9	Li Jianjun	2014	2
10	Zhang Lijun	2020	2
11	Zeng Jie	2020	2
12	Guo Xiaofang	2019	2
13	Jiang Ronghua	2019	2
14	Du Yao	2019	2

published in the table is not much different. It can be seen that the current research on human resource management with big data is relatively balanced in the distribution of authors.

3.3 Keyword

Selecting the node type of Citespace as the keyword can conduct a visual analysis of the scientific graph for the keywords. The result is shown in Fig. 2. The keywords in the graph are further clustered and summarized according to the LLR algorithm to obtain Fig. 3. The cluster map focuses on reflecting the structural characteristics between

Fig. 2. A visual map for the keywords

clusters, highlighting key nodes and important connections. Combining the keyword data in Figs. 2 and 3, the main focus areas of human resource management with big data research can be analyzed.

In Fig. 2, keywords with large font sizes, such as big data, human resources management, hr analytics, performance management, data analytics, and business intelligence which indicates that these keywords appear more frequently in articles. Keywords with relatively small font sizes such as artificial intelligence, information technology, model innovation, cloud services, etc. show that scholars still pay attention to other topics.

Due to the complex data of the keyword map, in order to improve the accuracy of summarizing the fields and with the help of the keyword clustering function of Citespace, the relatively close connections in Fig. 2 are aggregated to form clusters and shown in Fig. 3. According to the network structure and the clarity of clustering, Citespace provides two indicators, the module value Q and the average contour value S, where Q needs to be greater than 0.3 and S needs to be greater than 0.7. The data shows that the structure of the keyword clustering map obtained in this study is significant, the results are also convincing.

In Fig. 3, each cluster decreases in descending order of the number of documents contained in the numerical value.

Through the integrated analysis of the keyword information in Fig. 2, human resource management with big data research can be divided into innovative application of big data in human resource management, human resource reform with value-driven and talent assessment focusing on practical application.

3.4 Research Hotspot

Converting the keyword co-occurrence graph in Fig. 2 into a keyword time zone view as Fig. 4, combined with the research explosion points of human resource management with big data research that appeared in Citespace from 2013 to 2022 is helpful to discover research hotspots at different stages.

The research hotspot in 2013 was mainly to explore the feasibility and application prospects of big data technology in human resource management. For the new concept of big data at that time, scholars believed that it could bring about a revolution in human

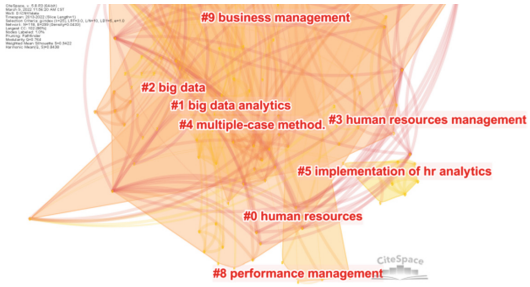

Fig. 3. A clustering map for the keywords

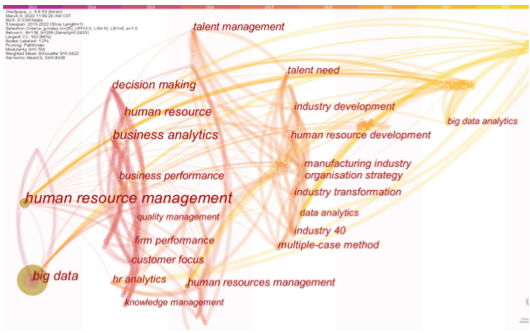

Fig. 4. Keyword time zone view

resource management. Whether it is based on the re-application of the original data of human resource management or the improvement of the efficiency of human resource management by big data, it is a beneficial reflection on the research and practice of traditional human resource management [10].

The research hotspot in 2014 is mainly the challenges brought by the application of big data and the Internet to the traditional human resource management, such as performance management and the corresponding countermeasures. The digitalization of human resource management can improve the operation performance, but the popularization of the Internet will also bring about an increase in employee turnover. How to seize opportunities and meet challenges in the new technological era has become a hot topic in both academic and practice [4].

In 2015, the research on human resource management with big data was mainly based on the idea of digitalization. Since the human resource management perceptual decision-making and experience orientation of enterprises in practice are still common, as the society enters the era of data-based and networked scientific management, it has become an important research direction to explore the human resources data and guide the scientific human resources management model of enterprises. The researchers believe that human resources in the new era, as a dynamic and highly uncertain main factors of production, management practices based on big data are carried out in each link of

selection, cultivation, use and retention, which can effectively improve the scientificity and effectiveness of management decision-making [3].

The research hotspot in 2016 focused on the combination of big data and daily affairs in human resource management. With the application of big data, by improving the ability of human resource strategy formulation and execution tracking, business data analysis and tracking can be achieved. The goal of setting and managing performance indicators enables human resource management to be truly driven by enterprise value creation [8].

After 2017, the research hotspot of human resource management with big data is mainly the intelligentization of human resource management. During this period, the research on the combination of human resource management and big data is not limited to helping enterprises become informational. It is to further explore the possibility of applying big data to help intelligentize human resource management by finding an appropriate way and define the evolution relationship between information-based human resource management and intelligent human resource management [7].

4 Problems Existing in the Current Research and Suggestions

From the start of 2013 to 2022, the research on human resource management with big data has made a lot of progress, but there is also room for improvement in the existing research.

First, the research on human resource management with big data is unbalanced. There is little cooperation between researchers and research institutions in this field. Due to the rapid development and application of big data in practice, academic research in academia lags behind practical application in business. As a technical force for the change of the times, big data has been applied to all aspects of business, such as medical care, retail, management and other fields. It may be because of its rapid development, in academic research, researchers have not yet formed a unified understanding of such a mature and applied technology. For related concepts such as digitized human resource management and intelligent human resource management, there is still a phenomenon of mixed use, and there is little research on the evolution relationship between these two concepts [7].

Secondly, there is more qualitative research and relatively little quantitative research. For example, the six major modules of human resource management include human resource planning, recruitment and allocation, training and development, performance, salary management and employee relations. Scholars believe that the application of big data will become the seventh module of human resource management, and the seventh module will inject new energy into other modules and provide excellent data support for each module, promote the comprehensive innovation of human resource management system and make relevant decisions based on data and objective facts, conduct comprehensive analysis of data, improve related work efficiency, scientific human resource management workflow, and make human resource management becomes a real value-added service [6]. Although the above research results have well pointed out the advantages and prospects of big data application in human resource management, but due to the lack of quantitative data, the guiding significance for practice is weak.

5 Conclusion

Effective use of appropriate research tools can facilitate the researcher. This paper uses Citespace to explore the development of human resource management with big data research, summarizes and analyzes the distribution of authors and institutions of human resource management with big data research and the distribution of research fields, the changes in research frontiers and so on. In the data analysis, it is found that the development of human resource management with big data research is at an early stage, and the development is relatively balanced, and there is no core figure ahead of other researchers. At the same time, the relationship between researchers and institutions are lack of connection and teamwork. In the analysis of the distribution of research fields and the changes of research fronts, it is found that there are problems of imperfect development and unbalanced development in the research on human resource management with big data. The practice lacks guiding significance, and the specific implementation path of big data application in human resource management is rarely discussed from the practical and micro levels. Therefore, researchers and research institutions in related fields should focus on the existing room for improvement, strengthen contact and cooperation with each other, find new research points, and strengthen research on weak links, so as to comprehensively improve the level of academic research in this field.

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