
Research Status, Hot Spots and Trends of Knowledge Management in China

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To cite this article:

Song Peng. Research Status, Hot Spots and Trends of Knowledge Management in China. *Science Development*. Vol. 2, No. 1, 2021, pp. 15-22. doi: 10.11648/j.scidev.20210201.13

Received: January 30, 2021; **Accepted:** February 7, 2021; **Published:** February 10, 2021

Abstract: In recent years, the rise of big data, artificial intelligence and other technologies has triggered a surge in data volume and information explosion, which has a huge impact on the research and practice of knowledge management. By combing the current situation, hot spots and future research trends of knowledge management research, we can provide reference for the innovation and breakthrough of follow-up research. This paper combs the literature on knowledge management in China from 1998 to 2018, studies the status quo, hot spots and trends of knowledge management research by using data statistics, knowledge mapping and key literature interpretation methods, and finds that China's knowledge management research has entered a relatively mature development stage; the research hot spots are mainly reflected in the following five aspects: knowledge sharing and knowledge transfer. The future research trends are summarized as knowledge management under artificial intelligence, knowledge sharing under sharing economy and knowledge service under data drive.

Keywords: Knowledge Management, Knowledge Sharing, Knowledge Service, Research Hotspot Trend Analysis

1. Introduction

With the development of a network new knowledge economy, knowledge has gradually become an important source of the core competitiveness of enterprises, organizations, and individuals, and knowledge management has also expanded to all areas of social and organizational systems. Knowledge management has developed for more than 20 years in China and has become a research topic of common concern of scholars in many fields, such as management, psychology, information science, computer science, education, and so on. However, in the current situation of our country, economic development and technological progress make the research field of knowledge management continue to expand, research perspectives continue to change, research methods more abundant, knowledge management is facing new opportunities and new challenges. Clarifying the development context of knowledge management research and exploring the trend of future research plays a key role in understanding knowledge management activities, effectively guiding knowledge management practice, and promoting the scientific development of knowledge in China.

At present, the research of knowledge management has

been widely concerned by scholars in the world. The main concerns are the classification of knowledge, the process, object, mode, function, and technology of knowledge management [1-4]. Comparatively speaking, foreign research is relatively scattered, focusing on knowledge management model [5], ontology knowledge management [6], etc., while domestic research is relatively concentrated, mainly from the perspective of organizational services to study knowledge management [7-9]. Some scholars have systematically combed the knowledge management research in some periods and some fields. For example, Zhou Zhongcheng reviewed the knowledge management research in the field of Library and information in China from 1999 to 2016 [10], and Tang Ting conducted a thematic analysis on the knowledge management in China's Fund Projects from 2006 to 2016 [11]. Few scholars have combed the research on knowledge management after 2016. However, since 2016, the rise of big data, artificial intelligence, and other technologies has caused a surge in data volume and information explosion, which has had a huge impact on the research and practice of knowledge management. Moreover, only combing the research on knowledge management in some fields can not reflect the overall outlook of knowledge management research. Therefore, this paper proposes some suggestions To grasp the

current situation and hot spots of knowledge management research and explore the research trend, this paper carries out keyword frequency statistics, map analysis, and content analysis on the literature related to knowledge management research in China from 1998 to 2018, to provide reference and inspiration for the research and practice of knowledge management and its related fields in China.

2. Definition of Knowledge and Knowledge Management

Scholars have different views on the definition of knowledge and the understanding of knowledge management from different perspectives. Firstly, this paper defines the definition, classification, and knowledge management of knowledge, and reviews the literature on this basis.

2.1. Definition and Classification of Knowledge

In the era of the knowledge economy, knowledge is one of the most valuable resources. Therefore, many knowledge management researchers have done a lot of research on the origin and classification of knowledge. At present, the definition of knowledge can be roughly divided into two kinds, namely, philosophical perspective and practical perspective. The definition of knowledge has been debated in western philosophy since ancient Greece, such as Descartes' rationalism in the 17th century, Chloé's empiricism in the 18th century, and Kant's theory of body and mind interaction in the 19th century [12]. Among them, the most classic definition is Plato's interpretation of knowledge in *Theaetetus*, that is, knowledge must satisfy three conditions: knowledge is correct, knowledge is perceived by people, and knowledge is verified as true belief [13]. From the perspective of practice, Wang Delu believes that "knowledge" is a systematic conclusion obtained by processing and refining, and comprehensively analyzing the internal relations of many materials [14]. Comparatively speaking, knowledge from the perspective of philosophy is more abstract, emphasizing the subjectivity and objectivity of knowledge, and more considering the influence of human value system on the formation of knowledge; knowledge from the perspective of practice is more concrete, emphasizing the decision-making, implementation and solution of tasks, and more valuing the practical value of knowledge to the society, which is more significant to guide practice. The starting point of this paper is to guide the practical activities related to knowledge in real life through the research of knowledge management, so it is more reasonable to define knowledge from the perspective of practice.

Polanyi first put forward the concept of tacit knowledge. According to whether knowledge can be easily identified, clearly expressed, and effectively transferred, knowledge can be divided into explicit knowledge and tacit knowledge. Explicit knowledge can be clearly expressed, acquired, and disseminated through word of mouth, written records, charts, audio-visual media, and other coding methods. However, tacit knowledge is difficult to express clearly, and cannot be

identified and transmitted through language, text, chart, and other coding methods. The internalization of tacit knowledge is influenced by personal experience and values in the individual mind. Only in a specific situation can tacit knowledge be transmitted through comprehension, thinking, and deliberate practice. Since then, this kind of knowledge classification has been widely accepted by management researchers. On this basis, Nonaka and Takeuchi proposed the SECI knowledge spiral model to explain the relationship between explicit knowledge and tacit knowledge.

2.2. Definition of Knowledge Management

As a research discipline, knowledge management originated in the 1960s from Drucker's assumption of "manager" [15]. Scholars at home and abroad have not reached a unified conclusion on what knowledge management is. Most foreign scholars interpret knowledge management from the perspective of process theory, such as Maryam Alavi, who believes that knowledge management is a dynamic and sustainable organizational phenomenon, involving a series of interactive processes such as knowledge creation, access, transformation, and application [16]. Bassi pointed out that knowledge management is a process of improving organizational performance by creating and applying knowledge [17]. The difference is that most domestic scholars explain knowledge management from their areas of expertise. Zhu Xiaochun and others analyze the problem of knowledge management in interactive innovation from the perspective of the life cycle and think that the essence of knowledge management is an interactive innovation and a link of knowledge classification, recognition, expression, fusion, and application [18]. From the perspective of knowledge network, Yang Junxiang and others believe that knowledge management is a process of improving learning ability and innovation ability, which is based on the special needs of the organization to build knowledge network and realized through its learning [19]. Shi Wengeng and others believe that knowledge management plays an important role between social capital and core competence both at the individual level and the organizational level [20]. Huang Huaxin and others equate the process of knowledge management with the process of knowledge conceptualization and think that knowledge management should pay attention to the process of knowledge utilization [21]. To sum up, knowledge management in this paper is a kind of management process to improve the learning ability and innovation ability of individuals or organizations through the creation, access, and sharing of knowledge.

3. Research Status of Knowledge Management

To grasp the research progress of knowledge management more clearly, the author uses keyword frequency statistics and keyword co-occurrence networks to analyze the literature data of CNKI.

3.1. Literature Data Collection

The author uses CSSCI (Chinese social science citation information) as the Chinese data source and "knowledge management" as the subject word to search. The final search time is February 20, 2019, and the publication period is 1998-2018. After manually eliminating meeting notices, news, summary, and journal catalog abstracts, 4164 Chinese works of literature were finally obtained as research samples. Then, the author used Excel to count the number of papers according to the year of publication and used CiteSpace software to count the frequency of keywords and analyze the keyword co-occurrence network.

3.2. Literature Data Analysis

The research on knowledge management in China began in the 1990s, and the research results were first published in CSSCI core journals in 1998. The number of research papers has decreased year by year since 2008, but it remains at more than 50 per year. What needs to be further explained is that the decrease of literature quantity can not explain the decline of the development of knowledge management discipline in China. The reason is that due to the rapid development and in-depth research of knowledge management in China for more than 20 years, its subdivision fields continue to appear,

which leads to the surface phenomenon that the literature quantity of knowledge management research in China decreases year by year after 2009. This shows that knowledge management research has entered a relatively mature stage of development after rapid development and a great breakthrough in China [10]. By fitting the exponential function of the cumulative number of published papers, the R^2 of the fitting curve is 0.9776, which shows that the cumulative number of literature in knowledge management research is growing exponentially. Since 2012, the distance between the actual value and the theoretical value of the annual cumulative literature has increased year by year, which indicates that the research on knowledge management in China tends to be mature after 2013.

3.3. Statistical Analysis Results of Word Frequency

To intuitively grasp the change of the research topic of knowledge management in China, and then find the research frontier, the author makes statistics on the word frequency of the literature from 2011 to 2014 and 2015 to 2018 and lists the top ten high-frequency keywords in 2015-2018 in Table 1 without taking into account the core search term "knowledge management", to analyze the comparison between 2015-2018 and 2011-2014 years of keyword frequency ranking changes.

Table 1. Changes of key words in knowledge management research.

key word	Comparison between 2015-2018 and 2011-2014 change
Knowledge sharing, knowledge service and university map Library, organizational learning and innovation performance	Rank up
Library, knowledge innovation, Tacit knowledge	Rank down
Personal knowledge management	remain unchanged
big data	Emerging

It can be seen from table 1 that personal knowledge management is a topic of continuous concern, the attention of knowledge innovation and tacit knowledge has decreased, and the attention of knowledge sharing, knowledge service, University Library, organizational learning, and innovation performance has increased. This is similar to the keyword co-occurrence network analysis. From the perspective of new high-frequency keywords in 2015-2018, China recently focuses on using big data technology to explore new technologies, new methods, and new models of knowledge management.

4. Research Hotspots of Knowledge Management

To fully understand the research hotspots of knowledge management and clarify the relationship between different research topics, the author uses CiteSpace software to generate a visual co-occurrence network. From the co-occurrence network nodes, we can see that the research hotspots mainly focus on five aspects, namely, knowledge sharing, transfer and innovation, library knowledge service, enterprise knowledge management, personal knowledge

management, and knowledge management system.

4.1. Knowledge Sharing, Knowledge Transfer and Knowledge Innovation

In order to realize knowledge appreciation, the knowledge owner shares the knowledge in the knowledge carrier through communication, so that the knowledge demander receives and digests the knowledge. This process is called knowledge sharing [22]. The research objects of knowledge sharing include individuals, enterprises, governments, research teams and online communities. Its core content can be divided into three parts: the first is the research on Influencing Factors of knowledge sharing, including internal and external motivation [23], cultural orientation in Chinese context [24], etc.; the second is the research on knowledge sharing performance, including the construction of performance evaluation index system [25], the influence mechanism of individual performance and organizational performance [3], etc.; the third is the research on knowledge sharing mode, including mechanism research [26], knowledge game [27], etc. Knowledge sharing plays an important role in the effective implementation of knowledge management, which is the prerequisite for the realization of knowledge management. The essence of knowledge management is innovation, which

drives the development of national economy, the growth of organizations and enterprises [28]. The core element of knowledge innovation is knowledge sharing and transfer. Knowledge sharing and transfer promote the continuous transformation of knowledge between implicit and explicit to complete knowledge innovation [22]. The research on the basic problems of knowledge transfer is mainly reflected in the concept, influencing factors and types of knowledge transfer. Nonaka and Takeuchi believe that knowledge can be divided into explicit knowledge and implicit knowledge, and a more detailed and feasible method is to divide knowledge into explicit knowledge, intrinsic knowledge and implicit knowledge. Explicit knowledge is the most easily recognized knowledge, often in the form of visible to the naked eye or language can be described; internal knowledge can not be easily identified as explicit, but can be transformed into explicit knowledge; while tacit knowledge is difficult to be transformed into tangible knowledge [28].

4.2. Library Knowledge Service

Library science and information science have been paying close attention to the related research of knowledge, especially after the classic theory of "Three Worlds" and Brooks's "information cognitive paradigm", knowledge research is the top priority in the field of Library and Information Science [29]. As early as the beginning of this century, scholars in the field of Library and information defined the connotation of knowledge service and extended it to the field of practice. There are many knowledge organizations providing knowledge services, such as libraries, think tanks, publishers, database providers, and so on. Chinese scholars pay more attention to the knowledge service research of university libraries, and university libraries mainly provide limited social services with forward-looking literature resources, which is based on the value orientation and resource advantages of libraries [30-31]. At present, under the digital background, there are several important research directions of library knowledge service research in China: how to innovate library knowledge service mode; how to build a reasonable and effective library knowledge platform based on knowledge supply and demand; how to further tap and release library knowledge serviceability. Big data, knowledge grid, knowledge mining, resource integration, subject service, and embedded service are becoming the research and development direction of knowledge service in China in the future.

4.3. Enterprise Knowledge Management, Organizational Learning, and Knowledge Management Strategy

To maximize the benefit of capital-output, enterprises initially introduced knowledge management, which became the original level of knowledge management [32]. In the knowledge economy society, how to establish the systematic practice of knowledge management is the most severe challenge that organizations are facing [33]. In practice, enterprise knowledge management pays more attention to achieving organizational goals, such as cultivating core

competitiveness, improving organizational performance, promoting organizational innovation, and continuous improvement. Enterprises should know how to effectively combine new knowledge with existing knowledge, and use the knowledge base to absorb new knowledge continuously to complete the self-strengthening of the organization. Therefore, the knowledge management of enterprises needs to start the process of identifying, absorbing, and applying new knowledge. Knowledge management and organizational learning are closely related but different. Knowledge management in enterprises promotes organizational learning and innovation, while organizational learning regards knowledge as a strategic asset, thus creating an organizational atmosphere to encourage knowledge-sharing [28]. The competitive strategy of an enterprise largely determines what kind of knowledge management strategy the enterprise adopts, and the improvement of the enterprise's knowledge management ability will contribute to the improvement of the competitive strategy [34]. Organizations with different competitive strategies will adopt different knowledge management strategies. The first is interpersonal oriented knowledge management under product focus strategy, the second is system-oriented knowledge management under imitation strategy, and the third is interpersonal system interaction knowledge management under differentiation strategy [34].

4.4. Personal Knowledge Management

The establishment and development of a learning society cannot do without the personal knowledge management of social members, which can effectively promote social members to enrich their knowledge base and practice the concept of lifelong learning [35]. In China, Lai Chunsheng and others first put forward the concept of personal knowledge management and initially explored the collection, accumulation, exchange, use, and innovation of knowledge from the perspective of personal knowledge management [36]. Since then, Chinese scholars have begun to study personal knowledge management from different aspects. Even though many scholars have not yet unified their descriptions of personal knowledge management, they all reflect that the connotation of personal knowledge management is to realize the effective use of personal knowledge and thus enhance their ability and create value [37]. The research of personal knowledge management mainly includes the following parts: first, from different individual objects (such as college students, teachers, and Librarians) to explain the content, methods, and implementation process of personal knowledge management; second, from the perspective of personal knowledge management tools, to study the needs and behaviors of personal knowledge management, improve the function of tools, and enhance the efficiency of personal knowledge management; third, from the perspective of personal knowledge management tools, to improve the efficiency of personal knowledge management. It is the research of personal knowledge management in Internet plus era, including the realization path and method flow of

individual knowledge management under MOOC platform, and how to deal with massive fragmentation of micro knowledge management under Web2.0 technology.

4.5. Knowledge Management System

Scholars at home and abroad do not have a unified understanding of the meaning of knowledge management system, but the research perspective can be roughly divided into two categories, information technology perspective, and system perspective. In the perspective of information technology, a knowledge management system is considered to be developed based on the information system, which can support the creation, storage, transfer, and application of knowledge in the organization, and is the supporting platform for the organization to implement knowledge management [38]. As an important coding means and development platform of knowledge, information technology is the core of the knowledge management system [9]. The main content of the research is hardware technology, including communication technology, natural language processing technology, neural network technology, data mining technology, and other intelligent technology. The second is theoretical modeling research, including the design, framework, working principle, and working process of the knowledge management system. But this lack of systematic thinking emphasizes that the research of information technology is at the expense of social, cultural, and behavioral attributes. From the system perspective, knowledge management is a highly comprehensive system engineering [32]. From this perspective, the construction of a knowledge management system needs knowledge elements, technical elements, organizational elements, human resources elements, and cultural elements. Although this view clarifies the elements and their relationships in the knowledge management system, it does not explain the role of each element and its constituent ratio in detail [39]. It is worth noting that from the system perspective, the evaluation of knowledge management system should not only cover the hardware foundation, platform operation efficiency but also consider the user experience, humanization, and other factors.

5. Frontier Trend of Knowledge Management Research

Through the statistics of literature data, the drawing of knowledge maps, and the induction of research hotspots, we can grasp the research progress in this field more effectively. Based on the above research analysis and literature screening and interpretation of the important literature of knowledge management research in recent three years (2016-2018 and part of 2019), the author boldly forecasts the research trend of knowledge management in China: the change of knowledge management under artificial intelligence, knowledge sharing under sharing economy and knowledge service under data-driven.

5.1. Knowledge Management Reform Under Artificial Intelligence

With the wide application of artificial intelligence technology and its rapid progress, the practice of knowledge management has undergone earth-shaking changes [40]. In the process of knowledge creation, artificial intelligence can accurately recognize static features such as text and pictures, and also dynamic features such as voice and body language. It can provide multiple information channels and knowledge for team communication by capturing keywords and finding explicit materials related to keywords and key problems Knowledge base, improve the efficiency of tacit knowledge. Besides, artificial intelligence technology based on big data analysis and machine learning can process, analyze and synthesize the individual's existing explicit knowledge for real-time correlation, prediction, and analysis, and generate new knowledge. Therefore, the related technologies based on artificial intelligence, such as machine vision, natural language processing, can simplify and efficiently realize different types of knowledge visualization and knowledge transformation among individuals, teams, and organizations. In the future, how to use artificial intelligence to better study knowledge management needs more scholars' attention. First, how to realize knowledge creation automatically and intelligently. Second, how to use artificial intelligence to avoid the loss of tacit knowledge such as personal experience and team atmosphere due to the departure of individuals, that is, the retention and dominance of tacit knowledge. Third, how to better embed artificial intelligence into the knowledge management system, explore people's knowledge demand and prediction behavior, and improve the efficiency of knowledge creation, sharing, transmission, and application.

5.2. Knowledge Sharing in Sharing Economy

Sharing economy promotes knowledge sharing and circulation. Up to now, the development of knowledge sharing in China has gone through three stages: the first stage is the embryonic stage of static knowledge acquisition based on Internet Encyclopedia Search; the second stage is the formation stage of knowledge exchange community represented by "Sina Aiwen" and "Zhihu"; the third stage is the prosperous stage characterized by real-time interaction and knowledge realization [41]. Under the background of sharing economy, the upgrading of consumption content, the enhancement of willingness to pay, and the cultivation of supply and demand subjects promote the expansion of knowledge sharing from free information, service crowdsourcing, education MOOC to knowledge payment [42]. From the initial development of knowledge sharing to today's knowledge payment, the interactive exchange of knowledge community has played a decisive role in its development and evolution [43]. Online knowledge community integrates massive fragmented information, plays the role of knowledge sharing platform, and solves the problem of knowledge supply and demand at both ends of the platform. The knowledge endurance of knowledge producers and the sustainable

development of knowledge platform is a big problem to be solved in the development of knowledge sharing. How can the platform provide a mechanism for producers to inject the power of knowledge production and innovation, and stimulate knowledge producers to upgrade their knowledge? How to stimulate the knowledge demand of knowledge consumers? How to build a community with good knowledge atmosphere, knowledge community and sense of identity? In addition, a large number of new carriers of knowledge dissemination will emerge in the future, and the definition of intellectual property rights is relatively vague. How to balance the situation of original knowledge plagiarism and efficient knowledge sharing? The problem of intellectual property rights in the process of knowledge sharing and transfer is becoming increasingly prominent, which will become another major bottleneck of knowledge sharing under the background of sharing economy.

5.3. Data-driven Knowledge Service

In the era of big data, data presents an explosive growth trend. A wide range of data sources, diverse data forms, and high-speed data generation speed provide a great convenience for knowledge services [44]. Data-driven data-driven is to collect a large amount of data utilizing mobile Internet or other related software, organize the data to form information, then integrate and refine the relevant information, and form automatic decision-making knowledge through training and fitting based on data. Data-driven reflects the data-based and data-intensive of knowledge services. Data-based means that knowledge services must be built based on data. Without data-driven, knowledge services will not be able to find new rules and generate new knowledge. Data-intensive attaches importance to the acquisition and utilization of massive data, especially through the complex multi-type data, mining out the future knowledge Trend, and model prediction analysis of valuable data. In our country, knowledge service is mainly studied from the perspective of Library and information. The realization of massive data from the collection, storage, mining to the user and industry-oriented knowledge service is a problem that has to be considered in the field of Library and information. Under the big data environment, the traditional management mode, work content, and the way in the field of Library and information have changed greatly. How to improve the data management ability of Library and information staff and transform it into a knowledge service? Facing the knowledge demanders with different subject backgrounds, how to meet the user's subject knowledge needs and personalized needs based on data, and carry out knowledge discovery, knowledge visualization, and other intelligent services? In the era of big data, there are still many problems of knowledge service that need to be discussed by Chinese scholars.

6. Conclusion

In this paper, we understand knowledge and knowledge management from the perspective of practice, and

systematically comb the relevant literature of knowledge management in China by using the methods of keyword frequency statistics, keyword co-occurrence network analysis, and literature content analysis. After induction and analysis, it is found that the research on knowledge management in China is growing as a whole, and has entered a relatively mature stage of development. Through further analysis of knowledge management related literature, it is found that: the current research focus is to explore knowledge sharing, knowledge transfer, knowledge innovation, library knowledge service, enterprise knowledge management, personal knowledge management, and knowledge management system; the future research trend is knowledge management under human intelligence, knowledge sharing under sharing economy and knowledge service under data drive.

Through the analysis of the current situation, hot spots, and trends of knowledge management research in China, the author puts forward the following suggestions for the follow-up research and practice: (1) from the perspective of process, comprehensive use of qualitative and quantitative methods, focusing on empirical research, to explore the internal path, influencing factors and effects of knowledge sharing, knowledge transfer, and knowledge innovation, to accelerate the creation of knowledge management model New technology and platform development. (2) From the perspective of objects, enterprises should open a new era of intellectual property protection, make the intellectual property an important link for enterprise development, help enterprises realize the realization of knowledge economy by using knowledge management, and help enterprises realize healthy and sustainable development in the process of innovation; libraries should break through the established thinking, provide multi-disciplinary, interdisciplinary and new disciplinary knowledge services, and fully grasp the advantages Data dividend in the information age can promote the improvement of knowledge service quality; individuals should learn to effectively identify and correctly use all kinds of knowledge management tools, get rid of the difficulties of knowledge selection and knowledge panic, and improve their knowledge management ability. (3) From the perspective of technology, it is necessary to turn the theoretical research of knowledge management related technology into application research, start from the actual needs of different disciplines, different industries, and different fields, take knowledge management users as the guide, make good use of big data, artificial intelligence, and other advanced information technology, and carry out the application innovation of knowledge management technology.

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