Information Management and System Clustering and Time Trend Analysis in the AI Era Based on Citespace — Taking WOS Data as an Example (2017-2026)

Xing Guo*

School of Health Services and Management, Shanxi University of Traditional Chinese Medicine, Jinzhong City, Shanxi Province, China, Postcode 030619

*1084555287@qq.com

Abstract. With the rapid development of the AI-driven information age, information management and information systems, as the management hub, play a crucial role in information collection, processing, and storage. However, current research on management information systems is extensive and highly overlapping. Therefore, this study, based on nearly 10 years of Web of Science (WOS) literature on information management and systems, utilizes Citespace visualization analysis tools and case comparison analysis methods to explore the research trends in information management and systems research, aiming to better identify future development directions and trends. Keyword clustering for information management and systems is mainly divided into 10 categories, such as #0 Cloud Computing, #1 Scoping Requirements, #2 AI and #3 Management Information Systems Effectiveness. Furthermore, based on the time trend analysis of information management and systems, differences exist between the various clusters; for example, some clusters show sustainable research, such as #1 Scoping Requirements, #3 Management Information Systems Effectiveness, and #7 Energy Management. #8 Information Management clustering, with some clusters showing discontinuous research, etc. Furthermore, comparative case studies revealed that information management and information systems are not limited to technological optimization, but also require integrating management information systems with real-world applications and data security risks to improve management efficiency.

Keywords: Information Management and Systems, AI, Citespace, WOS

1 Introduction

In the context of rapid AI development, information management systems play a crucial role in national development and construction. China's 15th Five-Year Plan emphasizes the need to improve basic data element systems and establish effective and scientific regulatory mechanisms to strengthen data security. Information management and information systems, as the central element, can more systematically manage and classify

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information, thereby improving its accuracy and security. Due to the widespread dissemination of information in today's era, the scope of information management systems has expanded, leading to a complex and diverse body of research that struggles to establish a clear narrative. Therefore, this study will systematically organize and summarize relevant literature on information management systems, utilizing literature visualization and analysis software to explore the main research directions and development trends of information management and information systems.

There is a lot of research on information management and information systems in the academic community. For example, in the application of education, Liu et al. (2023) found that the efficient enrollment system faced the problem of information lag in the digital transformation. Therefore, they constructed an information management system that is conducive to the efficient implementation of postgraduate enrollment and improved its management level and service quality [1]. Yan et al. (2019) found that there are many existing education systems but no accurate evaluation. Therefore, he used SABER-EMIS for qualitative analysis to provide a reference for the development of China's education management system [2]. Li (2021) found that the scale of sports education departments has been expanding, which has brought about management inconvenience. She then proposed Internet information management technology to improve management efficiency [3]. For employment, Chen et al., (2021) found that the job market has no clear positioning for information system management talents. Therefore, they provided a direction for the employment of information management and information systems majors through a series of analyses of word segmentation, keywords and market demand [4]. For technology and management, Wang (2018) found that with the continuous development of the digital information age, the importance of security information management has increased. Through literature analysis and content analysis, he summarized the research on the construction of the system and provided a direction for the research of China's security management system [5]. Zou et al., (2023) found that the combination of blockchain technology and supply chain information management is caused by the development and transformation of the supply chain. Therefore, through complex social technology systems, they explored the path and future prospects of supply chain information management under blockchain technology and proposed that the thinking on information management under social technology systems can make a significant contribution to the digital transformation and development of the supply chain [6]. Fang et al., (2022) found that scientific fault information management plays an important role in the equipment quality of aerospace launch sites. Therefore, through multi-faceted analysis, fault-free information management will have a disadvantage to aerospace launch and improve the equipment quality of aerospace launch sites [7]. Zhao (2023) found that the rapid development of China's insurance informatization construction has led to operational risk management issues. By constructing a management model for evaluation and analysis, operational management risks can be reduced and efficiency improved [8].

In summary, current research on information management and systems is diverse and highly overlapping. No research has yet clearly identified the development direction and trends of information management systems. Therefore, this study will utilize

the Web of Science database and the Citespace tool to analyze relevant academic research on information management systems. This will systematically outline the main lines and development directions of information management and systems, providing a correct direction for future research on information management systems and offering scientific theoretical references.

2 Analysis Methods and Data Source

2.1 Research Methods

This study employs a combination of quantitative and qualitative analytical methods. Quantitative analysis is a rational analytical method that uses data to objectively describe phenomena. This study utilizes Citespace, a tool developed by Chen in 2004. Citespace is software that uses the LLR clustering algorithm to quickly read large amounts of literature and perform visual analysis, capable of visually presenting the main research directions and development trends of information management systems. Qualitative analysis is an analytical method that draws conclusions and experiences from the summary analysis of specific phenomena. This study adopts a comparative case analysis approach to contrast classic cases of Information Management and Information Systems in the context of the rapid development of AI, thereby providing an accurate orientation for the future development of information management and systems.

2.2 Data Source

The data for this study primarily came from the Web of Science database (WOS) . A topic search was conducted using the term “information management system” as the keyword. To ensure the accuracy and broad reach of the data, the document type was limited to open-source English articles. Furthermore, to ensure the timeliness of the data, the time period was limited to 2017-2026, resulting in 11,522 core and relevant articles. Finally, to ensure the validity of the analysis, the top 1,000 most suitable articles were selected for analysis based on relevance.

3 Clustering and Trend Analysis in Information Management and Systems Research

3.1 Keyword Clustering Analysis

The study used Citespace’s LLR clustering to ultimately cluster into 10 categories. The main clustering dimensions are: #0 Cloud Computing, #1 Scoping Review, #2 AI, #3 Management Information Systems Effectiveness, #4 Semantic Framework, #5 Human Resource, #6 Health Information System, and #7 Energy Management. #8 Information Management, #9 Wireless Sensor (Fig. 1).

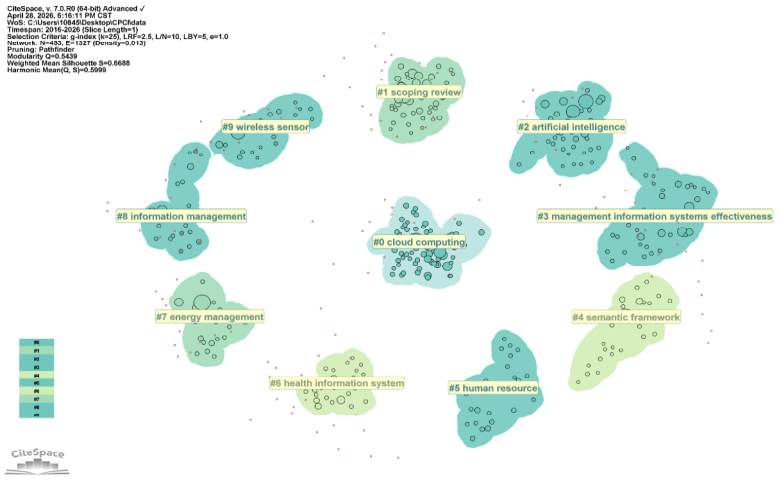

Fig. 1. Clustering graph of keywords in information management and systems

The study selected the top four clusters as the main analytical dimensions. For the #0 Cloud Computing cluster, it mainly includes Rapid Development (occurring 34 times), Information Sharing (occurring 20 times), Things Technology (occurring 17 times), Cloud Computing (occurring 12 times), and Information Security (occurring 12 times). Analysis of its formation reveals that with the continuous development of the information age, cloud computing, as the main information dissemination platform, primarily addresses the problems of low data transmission efficiency and data inaccuracy, meeting the demands of the times. Furthermore, current social development and information management place greater emphasis on the impact of rapidly developing cloud computing on information security and sharing, therefore, this cluster has received considerable research, showing a sustainable development trend. For the #1 Scoping Review cluster, it mainly includes Geographic Information System (occurring 41 times). Blockchain Technology (occurring 21 times), Communication Technology (occurring 18 times), Digital Twin (occurring 15 times), and Data Management (occurring 14 times). Analysis of this cluster reveals that due to the ongoing impact of Covid-19 in 2019, a global shortage of healthcare resources led to more refined and widespread management. Therefore, this cluster primarily collects information management related to healthcare and aid at that time, with most studies focusing on recording data from remote patient treatment and the rational planning of hospital construction. Furthermore, this cluster also includes numerous studies focusing on healthcare data management and information security, as well as the needs and risks of hospital construction. For the #2 AI cluster, it mainly includes Big Data (occurring 52 times), AI (occurring 43 times), Big Data Technology (occurring 14 times), Current Situation (occurring 14 times), and Machine Learning (occurring 12 times). On July 8, 2017, The State Council of the People's Republic of China issued a notice on the development plan for a new generation of AI, emphasizing the need to quickly grasp the major strategic importance

of AI development and accelerate research on building an innovative and technologically advanced nation. The notice also focused on the current state and development models of AI, thus this cluster encompasses a wide range of research related to AI and information management, showing a sustainable development trend. For cluster #3

Management Information Systems Effectiveness, it mainly includes Management Information Systems (occurring 23 times). Data Collection (occurring 21 times) Emergency Management (occurred 11 times) Integrated Management (occurred 10 times) Covid-19 Pandemic (occurred 10 times). Similarly, the Covid-19 outbreak led to a surge in medical data. Management information systems, as the central management system, aim to improve data processing efficiency and the rationalization of hospital construction. They primarily address hospital management and patient information management issues during sudden outbreaks, with a greater focus on the role and value of management information systems during the Covid-19 pandemic.

3.2 Trend Analysis

Through time trend analysis using Citespace, it was found that from 2016 to 2026, the overall trend of information management and information systems research showed an increase from fewer to more, and then to more refined and expanded research (Fig.2).

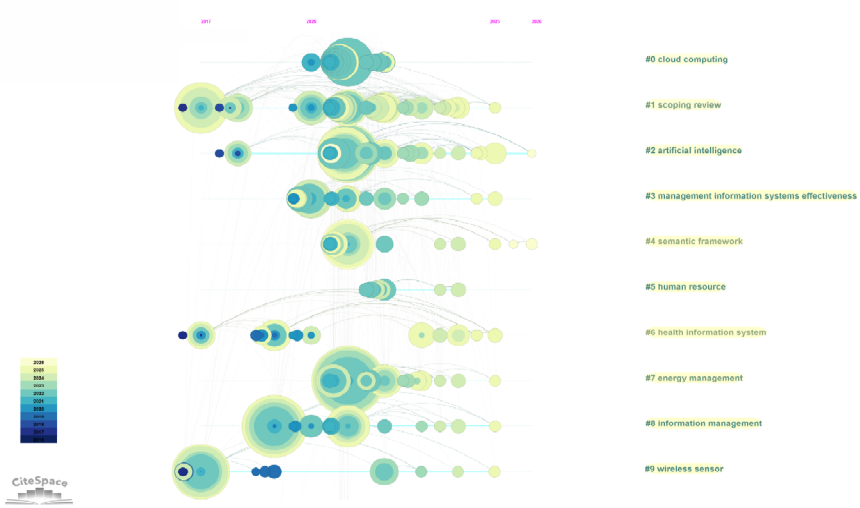

Fig. 2. Time trend graph of keywords in information management and systems

Specifically, the changes for each cluster are as follows. For the #0 Cloud Computing cluster, the research period is 2020-2022, and the main changes are from medical information to healthcare personnel, data mining algorithms, and financial management. With the accelerated development of the Internet and the continuous optimization of cloud computing, China's 2020 action plan to promote cloud computing, data utilization, and intelligence aims to cultivate new economic development and proposes to vigorously develop healthcare cloud to achieve high efficiency in future office work

and information management, thus expanding the application areas of cloud computing. For the #1 Scoping Review cluster, the research period is 2017-2025, and the main changes are from real-world cases to abnormal states, advanced cancer, external databases, and facility management systems. Due to the relatively broad scope of the review, it cannot address the abnormal status quo in cancer. To improve the usability of the review, it should be based on data and literature from external databases to promote the development of management systems and expand their application scope. For the #2 AI cluster, the research period is 2018-2026. The main changes observed were from supplementary data to implementation processes, comprehensive understanding, and asset information. In 2017, China issued the guiding document, the "New Generation AI Development Plan," which stated that AI, relying primarily on data algorithm models to solve basic problems, cannot handle the complex and ever-changing challenges of the digital information age. Therefore, to improve the comprehensive value of AI, research should summarize and optimize from numerous practical processes. For the #3 Management Information Systems Effectiveness cluster, the research period is 2019-2025. The main changes observed were from fuzzy theory to the Covid-19 pandemic, information dissemination, and business process management. Due to the massive outbreak of Covid-19, fuzzy ethics was unable to cope with the massive amount of information and rapid dissemination brought about by the pandemic. To improve business management efficiency, it is necessary to optimize the data collection, storage, and security functions of management information systems. For the #4 Semantic Framework cluster, the research period is 2020-2026. The main changes observed were from architectural design to actual implementation, data acquisition tools, and asset management platforms. With the continuous development of digitalization and information technology, semantic frameworks are limited to superficial understanding. To improve the practicality of semantic frameworks, research needs to realize the entire process of semantic framework from design to implementation to analysis and summary.

For the five lower-ranked clusters, such as #5 Human Resource cluster (studied 2021-2024), the research primarily revealed changes from database design to environmental management and debt performance. Due to the complexity and disorganization of human resource information, databases can efficiently and accurately organize people's information, but the unpredictable environment leads to the disordered presentation of information. To improve management efficiency and accuracy, it is necessary to optimize the management system and expand the scope of information management. For #6 Health Information System cluster (studied 2017-2025), the research primarily revealed changes from increasingly more abstracts to personal health, sufficient information, and management support. With the popularization of hospital informatization, people can have a complete and clear understanding of their personal health status and have increased their attention to personal physical and mental health, leading to an increase in the amount of information and an expansion of information management risks. To ensure patient information security, medical information systems must accurately manage patient data. For #7 Energy Management cluster (studied 2020-2025), the research primarily revealed changes from learning management systems to energy management methods, daily management, and data governance. For example, China's "Improving the Dual Control Plan for Energy Consumption Intensity and Total Amount"

proposes strengthening the dual control of energy consumption, finding appropriate management methods for different energy sources, and extending management techniques to daily life, while effectively managing large amounts of fragmented information. For the #8 Information Management cluster, the research period is 2018-2025, and the main changes observed are from action research cycles to coronavirus diseases, information management technologies, and large language models. The reason for this is that the rapid development of the information age has made action research cycles unable to keep up with the times. For example, the sudden surge in information volume during the Covid-19 pandemic necessitates strengthening information management technologies to ensure compliance and efficiency, while utilizing large language models to assist humans in information management. For the #9 Wireless Sensor cluster, the research period is 2017-2025, and the main changes observed are from loss-of-control protection to information security, real-time, and closed-loop management systems. With the optimization and upgrading of network hardware, the loss-of-control function of wireless sensors alone cannot meet people's needs for real-time information monitoring and management. Therefore, to improve management efficiency and security, it is necessary to strengthen the construction of closed-loop management systems.

4 Case Study

Based on the above analysis, this study explores relevant cases in cutting-edge clustering, compares and analyzes them in detail, identifies their innovative points and development significance that can be learned from, and thus lays the corresponding theoretical and practical foundation for the subsequent development of information management and systems, as shown in Table 1.

Table 1. Detailed Case Studies of Information Management and Systems

Clustering	Case	Innovation of Case
#0 Cloud Computing	*The comprehensive cloud-based implementation of medical services at Tongji Hospital, affiliated with Tongji Medical College of Huazhong University of Science and Technology.*	A medical cloud platform is built based on a microservice message-driven software architecture and cloud architecture, along with link monitoring, aiming to promote the rational layout and development of multiple hospital areas and improve management efficiency.
#1 Scope Requirements Engineering	*GW Company TK Hospital Medical Quality Control Platform Project Scope Management*	Based on the PMBOK guidelines and combined with CMMI and the waterfall model, a scope management plan was developed to improve management and enhance the company's project profitability.
#2 AI	*China Eastern Airlines AI Multimodal Document Review System*	China Eastern Airlines has introduced WPS 365, a one-stop AI collaborative office platform, to build a secure and efficient new paradigm for collaborative work and improve organizational efficiency.

#3 Management Information System Effectiveness	*"Digital Sentinel System for Epidemic Prevention" at Construction Site of Egypt's New Administrative Capital*	By constructing a 3D behavioral map of construction workers using an RFID positioning system, an intelligent agent model (ABM) is developed to achieve real-time tracking and prediction functions.
#4 Semantic Framework	*Nanchang University's BIM Compliance Automated Inspection Framework Based on Semantic Web and IFC*	By combining semantic network technology with IFC to construct a design inspection framework, the problems of time-consuming, labor-intensive, and inefficient traditional manual inspection can be solved.
#5 Human Resource Management	*H&H Group Global HR Management System*	A dual-data center architecture was built to support compliance management in 17 countries, enhance data capabilities, and improve operational efficiency.
#6 Health Information System	*Xiamen University Affiliated Chenggong Hospital: A Smart Hospital with Full-Scenario Information Technology Innovation*	Hygon has introduced the x86 architecture, digested and absorbed its own iterative model, and built the C86 technology system. This enables the CPU and DCU to be benchmarked in multiple scenarios, ensuring the stable and efficient operation of domestically produced software and hardware systems.
#7 Energy Management	*Fangda Special Steel Multidimensional Energy Management System*	Constructing a 65 MW ultra-high temperature subcritical generator intelligent substation to improve energy efficiency and reduce costs.
#8 Information Management	*Code Center's "Trusted Data Space + Dynamic GIS + Large Model" Smart Governance Platform*	To build a "data + scenario + rule" practice paradigm, promote the marketization and value realization of data elements, and improve the efficiency of government collaboration.
#9 Wireless Sensor Networks	*"Smart Fire Prevention and Control Network" in Andingmen Subdistrict, Dongcheng District, Beijing*	Intelligent detection and early warning systems, enabling multiple alarms from a single alarm, reduce fire losses and protect the lives and property of the people.

In summary, the case studies of different clustering methods mostly revolve around the technical aspects, conducting research through the construction of technical models, and primarily focusing on the development of management efficiency. However, it is necessary to pay attention to the potential risks involved in the development process and prepare countermeasures in advance.

5 Conclusion and Finding

Based on Citespace's literature visualization analysis and case comparison analysis, this study found that keyword clusters related to information management and systems can be mainly divided into 10 categories, such as #0 Cloud Computing, #1 Scoping Review, #2 AI, and #3 Management Information Systems Effectiveness. Furthermore, analysis of the time trends of information management and systems reveals differences in the development of these clusters. For example, some clusters show continuous re-

search, such as #1 Scoping Requirements, #3 Management Information Systems Effectiveness, #7 Energy Management, and #8 Information Management; some clusters show intermittent research, such as #5 Human Resource, #6 Health Information System, and #9 Wireless Sensor; and some research has emerged recently and has significant contemporary relevance, such as #2 AI and #4 Semantic Framework. Moreover, case comparison analysis reveals that cases across different clusters often utilize optimization techniques to address inefficiencies in actual management. Therefore, considering the dual nature of management technology optimization and data security risk governance, future analysis should focus more on intelligent management technologies and regulations to better address the impact and challenges of the digital and AI era on information management and systems. For example, governments should improve regulations governing data security, enterprises need to strengthen employees' awareness of data security, and researchers should develop data risk assessment models. Due to limitations in scope and time, this study is a retrospective study with a limited scope, selecting only the WOS database indexed in international journals, and lacking sufficient focus on specific countries. Therefore, future research could consider covering more databases for detailed comparative and integrated analysis, laying a stronger theoretical foundation for the development of information management and systems.

References

1. Liu Xiaoyan, Huang Jing, Li Zefang, et al. Research on a new generation of postgraduate entrance examination information management system--taking Tsinghua University as an example [J]. Modern Educational Technology,2023,33(09):110-117. https://kns.cnki.net/kcms2/article/abstract?v=3uoqIhG8C44YLTlOAiTRKu87-SJxoEJu6LL9TJzd50n&uniplatform=NZKPT
2. Yan Wenle, Bai Yu. An Exploration of the Evaluation of the World Bank's SABER Education Management Information System - A Case Study of Maryland, USA [J]. Foreign Primary and Secondary Education, 2019, (08): 37-45.https://kns.cnki.net/kcms2/article/abstract?v=3uoqIhG8C44YLTlOAiTRKu87-SJxoEJu6LL9TJzd50n&uniplatform=NZKPT
3. Chen Minghong, Zhang Qianlin, Han Jing. Analysis of Recruitment Demand and Training Implications for Information Management and Information Systems Professionals [J]. Library Science Research, 2021, (20): 9-20. DOI: 10.15941/j.cnki.issn1001-0424.2021.20.004. https://10.15941/j.cnki.issn1001-0424.2021.20.004
4. Wang Bing, Wu Chao. International Research Progress on Safety Management Information Systems: A Typical Literature Analysis Based on Web of Science Database [J]. Journal of Information, 2018, 37(11):131-136. https://10.15941/j.cnki.issn1001-0424.2021.20.004
5. Zou Liuxin, Wu Jiang, Xia Mengchen. Framework, Path and Challenges of Blockchain-Empowered Supply Chain Information Management from the Perspective of Complex Socio-Technological Systems [J]. Journal of Information Resource Management, 2023, 13(01):91-102. DOI:10.13365/j.jirm.2023.01.091. https://10.13365/j.jirm.2023.01.091
6. Fang Shiyuan, Li Xinwei, Li Yan, et al. Fault Information Management and System Design for Space Launch Sites [J]. Aerospace Industry Management, 2022(4):13-18. DOI:10.3969/j.issn.1004-7980.2022.04.003.
7. Zhao Lei. Research on quantitative management of operational risk of insurance company information system under the new solvency supervision [J]. Insurance Research, 2023, (10): 67-81. DOI: 10.13497/j.cnki.is.2023.10.005. https://10.13497/j.cnki.is.2023.10.005