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Original Research

Mapping the Conceptual Structure of Information Management: Emerging Paradigms and Bibliometric Analysis

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Abstract

Information management (IM) involves coordinating, utilizing, and controlling information within organizations. Over time, it has evolved to encompass various definitions and perspectives, reflecting its importance in organizational productivity, decision-making, success, and information enhancement. This study aims to comprehensively analyze the conceptual structure of information management and explore newly emerged and highly considered topics in theory and practice. By examining its core dimensions and multidimensional nature, the research seeks to uncover distinct clusters and main topics through the bibliometric analysis of keyword co-occurrence in related publications. The research data consists of 14,740 publications obtained from the Web of Science. The analysis is conducted using VOSviewer and biblioshiny, which are tools for bibliometric analysis. This study identifies five main sub-domains within information management: health information and technology management, big data management, research data management, data management systems, and information technology management. Trend analysis reveals the emergence of influential topics such as COVID-19, blockchain, smart contracts, artificial intelligence, and digital twins, reflecting the field's rapid technological evolution. Citation analysis highlights that medical informatics, smart contracts, digital twins, and supply chain management are among the most impactful topics based on normalized citation rates. Furthermore, a notable thematic shift is observed from traditional information management practices toward more technical, systemic, and interdisciplinary approaches, particularly within health informatics and big data ecosystems. The findings underscore the dynamic

and evolving nature of information management, emphasizing its increasing reliance on advanced technologies, the integration of diverse disciplinary perspectives, and the growing importance of ethical data governance frameworks. By mapping thematic clusters, this study offers valuable insights for researchers, scholars, managers, and decision-makers, helping them identify emerging trends, focus on key areas of interest, and plan future research directions. The findings also provide useful guidance for ontology engineers and developers of knowledge organization systems (KOSs), supporting the design and refinement of ontologies related to information management.

Keywords: Information Management, Bibliometric Analysis; Keyword Co-Occurrence, Big Data Management, Data Management Systems, Information Technology Management.

Introduction

Information management (IM) encompasses a broad range of activities and disciplines associated with the theory and practice of effective coordination, utilization and control of information within organizations. Over the years, scholars and researchers have offered multiple definitions and conceptualizations of information management, reflecting its various perspectives and emphasizing different aspects of its role. Information management has been defined as the effective and efficient coordination of information extracted from various internal and external sources of an organization (White, 1985; Best 2010; Chatzipanagiotou, 2017), a tool for organizational productivity (Vickers, 1984; Wilson, 1989; Best 2010; Manandhar & Siebeneck, 2021), a tool for controlling information explosion and addressing decision-making complexity (Rowley, 1998), an enabler of organizational success (Reitz, 2004), and an enhancer of information characteristics (Ellis & Desouza, 2009).

The origin of the term "information management" can be traced back to the U.S. federal government and the Paperwork Reduction Act of 1977 (Detlor, 2010). Considering information as an organizational resource, it became vital in the late 1970s, leading to the emergence of information management (Macevičiūtė & Wilson, 2002). Subsequently, information management emerged as a distinct field, attracting the attention of experts and academic researchers who sought to develop its conceptual frameworks, methodologies, and practical procedures (Vickers, 1984; Wilson, 1989). Initially known as the management of information resources, information management primarily focused on data management (González-Valiente, León Santos, Arencibia-Jorge, Noyons & Costas, 2021). Consequently, the core definitions of information management revolve around the information cycle and chain, encompassing crucial processes such as information production, identification, provision, access, organization, transformation, control, processing, use, and dissemination.

The multifaceted nature of information management has been a topic of ongoing debate within the literature (Rowley, 1998; Detlor, 2010; Rodionov & Tsvetkova, 2015). The ambiguity of the concept of information itself (González-Valiente et al. 2021), with its variable nature and diverse roles, contributes to the diversity of perspectives on information management (Trauth, 1989). Scholars have recognized that information management draws on interdisciplinary issues, spanning fields such as computer science, organizational behavior, strategic management, systems analysis, information science, librarianship, and management (Rowley, 1998). Moreover, the term "information management" is often used interchangeably with related terms such as knowledge management, data management, and content management, reflecting the influence of organizational, library-related, and personal

perspectives (Chatzipanagiotou, 2017).

Rowley (1998) presents a hierarchical view of information management, treating it as a practical field with both technical and behavioral dimensions. Rowley's framework considers the structural construction of knowledge, research, and practice in this field, with four fundamental levels of study: information retrieval, information systems, information structures, and information environments. Additionally, Detlor (2010) highlights three main perspectives in the study of information management: the organizational, library, and personal perspectives. These perspectives encompass managing information processes in the information life cycle, leveraging information as a strategic asset, and catering to individuals' information needs and tasks.

Furthermore, information management is characterized by three fundamental concepts identified by Madsen (2013): organizational-level, content-centric, and technology-centric information management. Organizational-level information management aids organizations in learning, evaluating conditions and events, predicting trends, and fostering innovation. Content-centric information management encompasses areas directly related to information technology management, document management, resource and archive management, information process management, and information standards and policies (Choo, 2002). Technology-centric information management aligns strategic information management and business information by applying information technology (Johannessen & Olaisen, 1993).

Despite the diverse approaches to categorizing information in information management, a comprehensive, empirically grounded conceptual mapping remains underdeveloped. Previous models often lack integration between emerging interdisciplinary trends and classical categorizations, necessitating a new approach. In response to these limitations, this study aims to provide a comprehensive empirical analysis of the conceptual structure of information management. It investigates newly emerged and highly considered topics, examining the field's core dimensions and multidimensional nature. By uncovering distinct clusters and main thematic areas through bibliometric analysis of keyword co-occurrence, this research contributes to a deeper understanding of the evolving landscape of information management and lays the groundwork for future investigations. Therefore, our research questions are:

- What distinct clusters representing different subject areas within information management can be uncovered through bibliometric analysis?
- What newly emerged topics have been most influential in shaping the conceptual structure of information management?

Literature Review

The study of bibliometrics in the field of information management has garnered considerable attention in recent years. Researchers have employed bibliometric analysis to gain insights into the intellectual structure, publication patterns, and scientific cooperation networks of information management. The literature review explored several recent bibliometric studies conducted across different journals in the field of information management. Donthu, Kumar, Pandey and Gupta (2021) examined the scientific collaboration networks in the International Journal of Information Management, providing insights into the topics covered and the collaborative networks within the journal's scholarly community. González-Valiente et al. (2021) studied the evolution of intellectual structure in information management, highlighting

a shift from an organizational approach to an individual one, with a greater focus on information behavior and retrieval. Nayak, Parida, Verma and Hari (2021) conducted a bibliometric analysis of the *ASLIB Journal of Information Management*, identifying factors influencing research in the field. Sharma, Rana and Nunkoo (2021) conducted a comprehensive study spanning fifty years of information management research, identifying common themes and emerging areas of focus. Srivastava, Sharma, Kaur, Wamba and Wang (2021) analyzed the *Journal of Global Information Management*, categorizing its intellectual structure into distinct themes. Donthu, Kumar Badhotiya, Kumar, Soni & Pandey, (2022) provided a retrospective overview of the *Journal of Enterprise Information Management*, identifying the major themes that define the journal. Overall, these studies offer insights into the research landscape and trends within information management across a wide range of scientific fields.

Recently, various studies have been dedicated to exploring bibliometrics within specific areas of information management, including research data management, big data, and health information management. In the realm of research data management, a study by Corrall, Kennan, and Afzal (2013) looked at library support services. They found that while bibliometric services were established, support for data management was still developing, indicating there's a lot of potential for advancements in policy and technology in this area. Arora and Chakravarty (2021) took a broader look at the scientific landscape of research data management and noted a peak in publications in 2020. They highlighted keywords like data sharing, metadata, and research data, and observed that applications spanned various fields, including medical sciences, banking, and defense. Naseema and Sevukan (2022) did a global bibliometric analysis of over 6,200 documents and found that the leading domains were computer science and library & information sciences, with the U.S., China, and the UK being the front-runners.

When it comes to big data, Jin and Li (2019) visualized trends in multimedia big data research. They discovered that the focus shifted from security and algorithm concerns to applications and social impacts, exploring emerging topics like the Internet of Things (IoT), precision medicine, and privacy. Marín-Marín, López-Belmonte, Fernández-Campoy and Romero-Rodríguez (2019) analyzed how big data is used in education, mentioning that despite its potential, the education sector hasn't fully embraced it, primarily due to teachers not having the necessary tech skills. Batistič and van der Laken (2019) looked at how big data analytics relates to organizational performance and identified ten research clusters, including marketing and customer analytics, IT, and supply chain. Esfahani, Tavassoli and Jabbarzadeh (2019) conducted a scientometric analysis of big data and social media, pinpointing decision support systems as a key focus area and noting that topics like Twitter and big data analytics are still underexplored. Galetsi and Katsaliaki (2020) reviewed the surge in publications about big data analytics in health, particularly after 2014, focusing on neurology and oncology, with tools aimed at disease prediction and monitoring. Khanra, Dheer and Mantymaki (2020) provided a bibliometric synthesis of big data in organizations, revealing four main themes: strategic decision-making, conceptual development, application trends, and supply chain management. Rawat and Sood (2021) identified emerging topics in big data analytics, like artificial intelligence, deep learning, blockchain, and edge computing. Finally, Ragazou, Passas, Garefalakis, Galariotis and Zopounidis (2023) analyzed 650 documents related to big data in information management, highlighting five key clusters related to AI, IoT, and decision-making, while also introducing COVID-19 as a new variable and customer behavior analysis as a compelling topic.

In the area of health information management, Epizitone, Moyane and Agbehadji (2022) conducted a bibliometric analysis of health information systems, finding that topics like COVID-19, artificial intelligence, and machine learning were emerging, while issues such as telehealth and health-related quality of life have been long-standing, showing a connection to the Fourth Industrial Revolution. Tchuente, Niava and Wamba (2021) studied information management regarding COVID-19 vaccines across over 8,000 documents, identifying four main themes: vaccine development and safety, vaccine hesitancy and social media, COVID-19 treatment and prevention, and public health ethics. They also suggested future research directions, such as examining misinformation and the role of information systems in vaccine supply chains. Despite these insightful contributions, there is still a lack of a comprehensive understanding of the overall conceptual structure of information management, particularly based on large-scale bibliometric data. This study aims to fill that gap by creating an integrated conceptual map of the field.

Materials and Methods

Data collection

The research data consisted of 14,740 publications in the field, indexed in the Web of Science (WoS) database, published from 2013 to 2022. The data set was reduced to the indexes: Science Citation Index-Expanded (SCI-EXPANDED), Social Science Citation Index (SSCI), and Arts and Humanities Citation Index (A&HCI). The search was conducted on April 26, 2023. The search query included keywords proposed by some experts, as well as consulting the Library of Congress Subject Headings, including "information management, information resource management, data management, data resource management, information manager, information life cycle, information technology management" in different forms, both singular and plural. These search terms were selected from relevant keywords in information management, with consultation from experts in the field, and by referring to *the Library of Congress Subject Headings*. The final results were randomly controlled to ensure that publications outside the field of information management did not appear in the output. The bibliographic/bibliometric information for the publications was downloaded in TXT format. During data preparation, keyword matching across singular and plural forms was checked.

Data analysis

Two software packages, VOSviewer version 1.6.19.0 and biblioshiny as a part of the bibliometrix package version 4.1.3, were used for data analysis. The co-occurrence network of keywords was constructed using the TXT file and VOSviewer software. Bibliometric information, such as the number of publications, number of citations, average citations per publication, average normalized citation, and publication age was extracted from the Excel output of the software. VOSviewer is free Java software used in this study to visualize the co-occurrence structure of information management keywords. VOSviewer (Visualization of Similarities Viewer) is a tool that creates maps based on network data (Van Eck & Waltman 2010). These maps provide visualizations that allow researchers to explore individual items and relationships among them. There are various methods for establishing connections between items in these networks, including, among others, keyword co-occurrence. The trend topics were drawn using the biblioshiny software interface. Biblioshiny is a web interface for the bibliometrix R package, which allows for bibliometric analysis and visualization of a collection

of scientific publications (Büyükkidik, 2022).

Naming of the clusters

In this study, cluster naming was conducted using a combined approach that incorporated objective analysis and expert judgment. Initially, descriptive keywords or phrases within each cluster were examined to identify common themes and the primary focus of each group. Five domain experts, knowledgeable in information management, reviewed the composition of the clusters and provided insights to refine and finalize the names. The selection of cluster names was guided by specific criteria, including thematic coherence, keyword representativeness, and alignment with contemporary terminology in information science, ensuring that the names accurately captured the underlying themes and concepts.

Results

Highly occurring keywords and the co-occurrence network

Keywords that occurred in the publications amounted to 29,940. The range of keyword links was 49-205, and that of total link strength was 108-3059, reflecting the appropriate internal coherency of co-occurred keywords. Figure 1 illustrates the visualization map of co-occurred keywords. A total of 209 keywords with 50 or more occurrences were mapped into 5 distinct clusters, each representing a main specific topical area in information management.

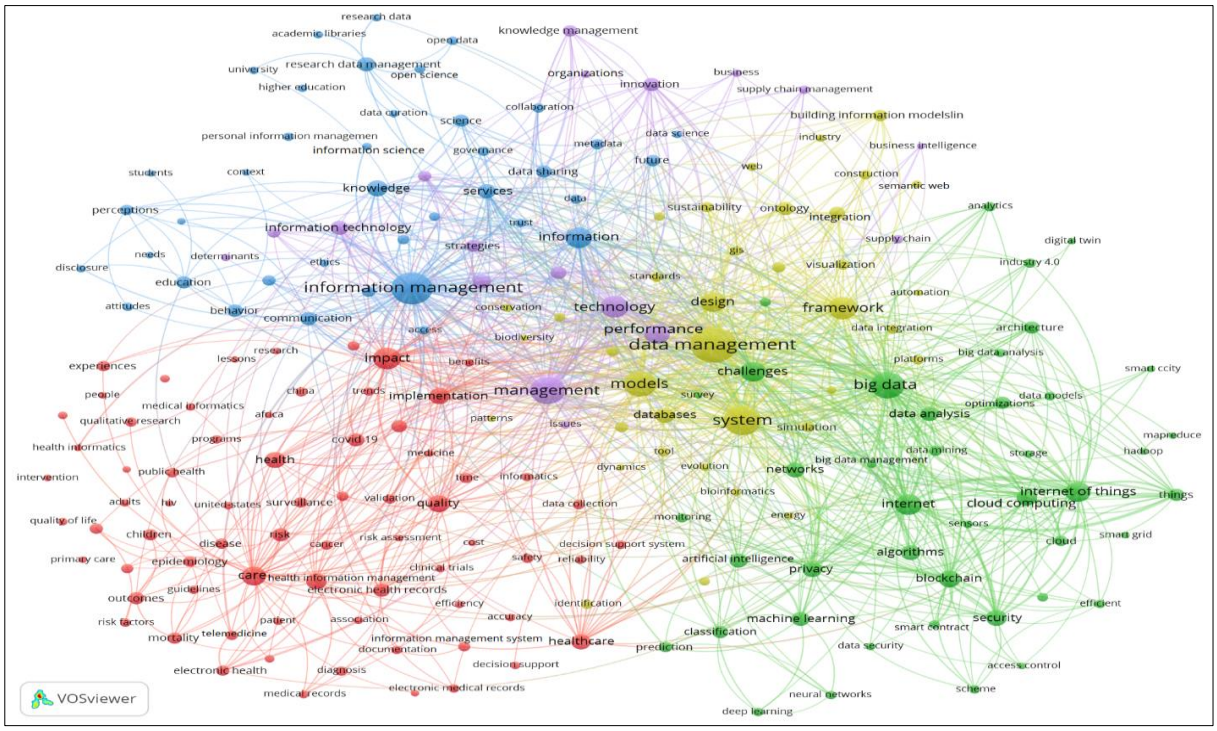

Figure 1: Co-occurrence network of keywords. Some keywords are not visible due to overlapping

The first cluster (in red) consists of 71 keywords. Among the most frequently occurring keywords in this cluster are "Care, Health, Health Information Management, Health Care, Electronic Health Record, Electronic Health, Information Management System, Public Health, and Informatics". These keywords align with the main topics of the cluster, indicating its association with health information and technologies management. In terms of demographic

and geographic aspects, keywords such as "Children, Adults, Society, and People" suggest that the primary target population and the three geographical regions of "China, the United States, and Africa" are prominently featured in the publications of this cluster. The abundance of keywords in this cluster signifies the broad and diverse range of topics it encompasses. Keywords such as "Epidemiology, Surveillance, Disease, Prevalence, Mortality, Telemedicine, Public Health, Prevention, Diagnosis, and Risk" indicate that some documents within this cluster focus on the management of health information and technologies in the context of outbreak, surveillance, diagnosis, prevention, and control of diseases, as well as their impact on public and individual health. Additionally, keywords such as "Electronic Health Record, Data Quality, Electronic Health, Information Management System, Informatics, Electronic Medical Record, Decision Support System, Health Information System, and Medical Informatics" highlight the methods, technologies, systems and standards employed in the subfield of health information management for managing (collecting, processing, storing, analyzing and presenting) the health information.

The second cluster (in green) comprises 43 keywords. The most frequent keywords within this cluster, which also represent its main topics, include "Big Data, Internet, Internet of Things, Cloud Computing, Machine Learning, Artificial Intelligence, and Data Analysis". These keywords indicate that the cluster is associated with big data management. The presence of keywords such as "Internet of Things, Blockchain, Industry 4.0, Smart City, Digital Twin, and Smart Grid" suggests that the papers in this cluster explore applications, industries, or societal domains that utilize or are influenced by big data and its management. Keywords such as "Cloud Computing, Machine Learning, Artificial Intelligence, Data Mining, Hadoop, and Mapreduce" indicate the technologies, systems, algorithms, and methods used to process, store, analyze, and secure big data. Additionally, some keywords pertain to the "Challenges, Opportunities, Results, and Trends" associated with big data management. The predominant research methodology in this cluster is a survey. The topics covered in this cluster highlight the growing focus within the field of information management on managing and analyzing large, complex datasets, as well as the technologies and techniques that facilitate these analyses. Key themes emerging from this cluster include the significance of data security and privacy, the potential of artificial intelligence and machine learning to extract insights from data, and the role of emerging technologies such as Blockchain and the Internet of Things in transforming data management and analysis practices. The inclusion of keywords related to Industry 4.0, smart cities, and smart grids indicates an increasing emphasis on leveraging data and technology to enhance infrastructure, promote energy efficiency, and improve urban planning in the realm of information management.

The third cluster (in blue) consists of 39 keywords. The most significant and frequently occurring keywords in this cluster include "Information Management, Information, Knowledge, Research Data Management, Data Sharing, Data, Open Science, Personal Information Management, and Academic Libraries". These keywords align with the cluster's main topics, indicating an association with research data management. Specific subfields or application areas related to research data management are reflected in keywords such as science, open science, social media, governance, ethics, university, metadata, and higher education. The information within this cluster underscores the importance of managing and sharing research data within the academic environment. Additionally, topics such as metadata, data management, and personal information management are highlighted, emphasizing their

significance in organizing and managing research data. The inclusion of themes such as communication, scientific collaboration, behavior, access, context, information needs, and search suggests a focus on aspects of information-seeking behavior, particularly within the academic setting. This cluster also encompasses topics related to access, knowledge, information, and information management, as well as perceptions and attitudes towards data sharing and open science, indicating an interest in understanding the behaviors and motivations of researchers and other stakeholders in the academic community in the context of data sharing.

The fourth cluster (in yellow) comprises 38 keywords. The most frequently occurring main keywords in this cluster are "Data Management, Systems, Models, Databases, Ontology, Building Information Modeling, Software, Simulation, and Semantic Web". This indicates that the cluster is associated with the data management systems. Application and specific subdomains within this cluster include "Systems, Databases, Ontologies, Geographic Information Systems (GIS), Web, Energy, Climate Change, Bioinformatics, Biodiversity, and Automation", showcasing that the publications within this cluster cover technical and functional details embedded within the design domain and the implementation of data management systems across various scientific and industrial fields. Topics covered within this cluster include "Data Management Standards and Practices, Data Management Models, Templates and Frameworks, Data Types and Structure, Data Integration and Interoperability, Methodology, Infrastructure, Service and Protocol Selection, Storage, Search, Updating and Data Exchange, Data Protection and Control, and Data Analysis". The cluster also addresses different tools and platforms, as well as data quality, reliability and usability. Additionally, topics related to "Software, Platforms and Tools" indicate an interest in developing and implementing software and hardware solutions for data management systems in these areas. The inclusion of topics related to "GIS, Climate Change, Conservation, Biodiversity, and Bioinformatics" suggests a focus on environmental data management and analysis. "Automation, Search and Data Selection" are also covered, indicating an interest in developing efficient and effective methods for managing and analyzing large and complex data within data management systems.

The fifth cluster (in purple) comprises 18 keywords. The main and frequently occurring keywords in this cluster are "Management, Technology, Performance, Information Technology, Information Systems, Innovation, and Decision-Making". These keywords indicate that the cluster originates in the field of management and falls within the realm of information technology management and innovation. Application and sub-areas within this cluster include "Knowledge Management, Supply Chain Management, Supply Chain, Organizations, Businesses, and Business Intelligence". The keywords in this cluster reveal that publications in this field predominantly examine the relationships among performance, innovation, decision-making, and strategies in organizations and supply chains, using information technology and information systems. The topics within this cluster also encompass knowledge management, innovation, and business intelligence, which are crucial for enhancing organizational performance and decision-making. The inclusion of topics related to adoption and barriers demonstrates a focus on understanding the factors that influence the adoption of information management technologies and practices in business environments. Supply chain management and operations are also addressed, indicating an interest in information management and technology in the context of supply chains. The inclusion of topics related to organizations and businesses suggests a focus on comprehending the organizational and social implications of information management within business environments.

Newly-emerged topics and time overlay visualization map

Figure 2 depicts an overlay visualization of keywords over time, with gradient colors indicating the recency of document publication dates (the closer to yellow, the more recent the publication dates are). The newest 10 keywords in this field are: digital twin, COVID-19, blockchain, deep learning, smart contract, artificial intelligence, industry 4.0, machine learning, internet of things, and data models.

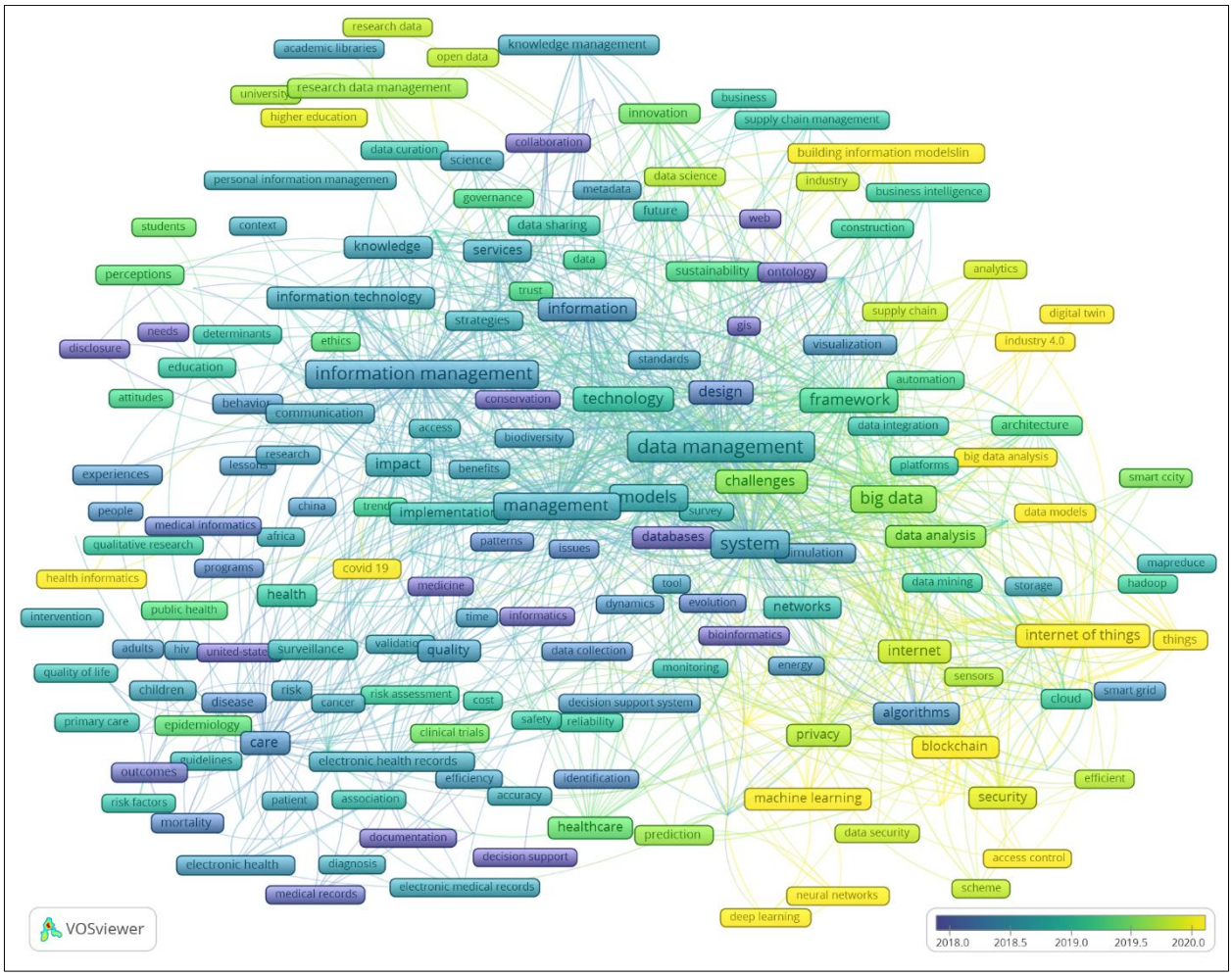

Figure 2: Overlay visualization map of co-occurred keywords over time Some keywords are not visible due to overlapping

Hot and highly considered topics and citation overlay visualization map

Figure 3 presents an overlay visualization map of keywords based on the average normalized citation rate, a refined indicator that adjusts for variations in citation patterns across fields and publication years. It is computed by dividing the average citations by the average number of citations received by all items in the same field and publication year. A value of 1 means that the items have an average impact, while a value greater than 1 means that the items have a higher than average impact. The keywords with the highest average normalized citations, indicating greater consideration, are "Medical Informatics, Smart Contract, Digital Twin, Blockchain, Smart City, Supply Chain Management, and Data Models". More keywords are highlighted in yellow.

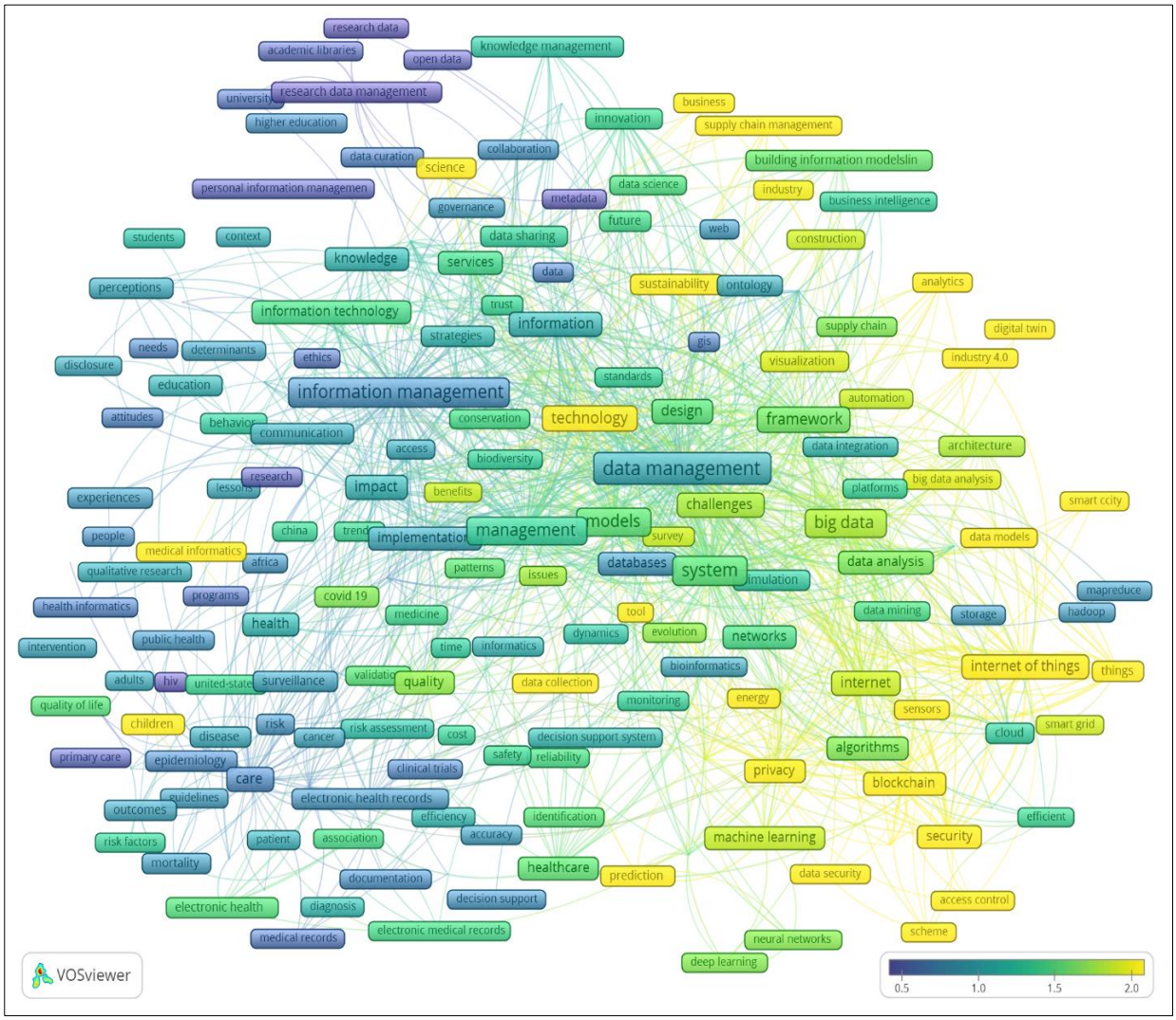

Figure 3: Overlay visualization map of keywords based on the average normalized citation rates. Some keywords are not visible due to overlapping

Trend topics

Figure 4 depicts a map of trend topics in information management, with 23 frequently occurring keywords. Trend topics identify the main themes, concepts, and research areas in information management. They also show the relationships and evolution of these topics over time. Through further investigation, it has been observed that there have been notable changes

in various topics within the field of information management over the 10-year period (2013-2022). In the cluster of health information management, there has been a gradual shift from informatics to medical services. This thematic development indicates an increasing interest in leveraging information management principles and technologies to enhance healthcare processes and outcomes. In the cluster of big data management, the importance of sensor networks diminished over time, giving way to the prominence of big data and subsequently, the digital twin. Initially, there was a focus on sensor networks, which are used to collect data from diverse sources. The concept of big data emerged, indicating a shift towards the management and analysis of large volumes of data. The inclusion of "Digital Twin" suggests the exploration of virtual representations of physical objects or systems that can be employed for simulation, monitoring, and analysis in the context of big data management. Furthermore, the presence and gradual emergence of keywords such as algorithms, blockchain, machine learning, and artificial intelligence within the big data management cluster highlight the growing emphasis on advanced computational techniques and technologies in this domain. The gradual replacement of digital twin with cloud computing demonstrates a shift from investigating cloud-based infrastructure and services towards exploring virtual representations for simulation, monitoring, and analysis within the field of big data management. This change indicates that the digital twin has gained significant attention and recognition in recent years.

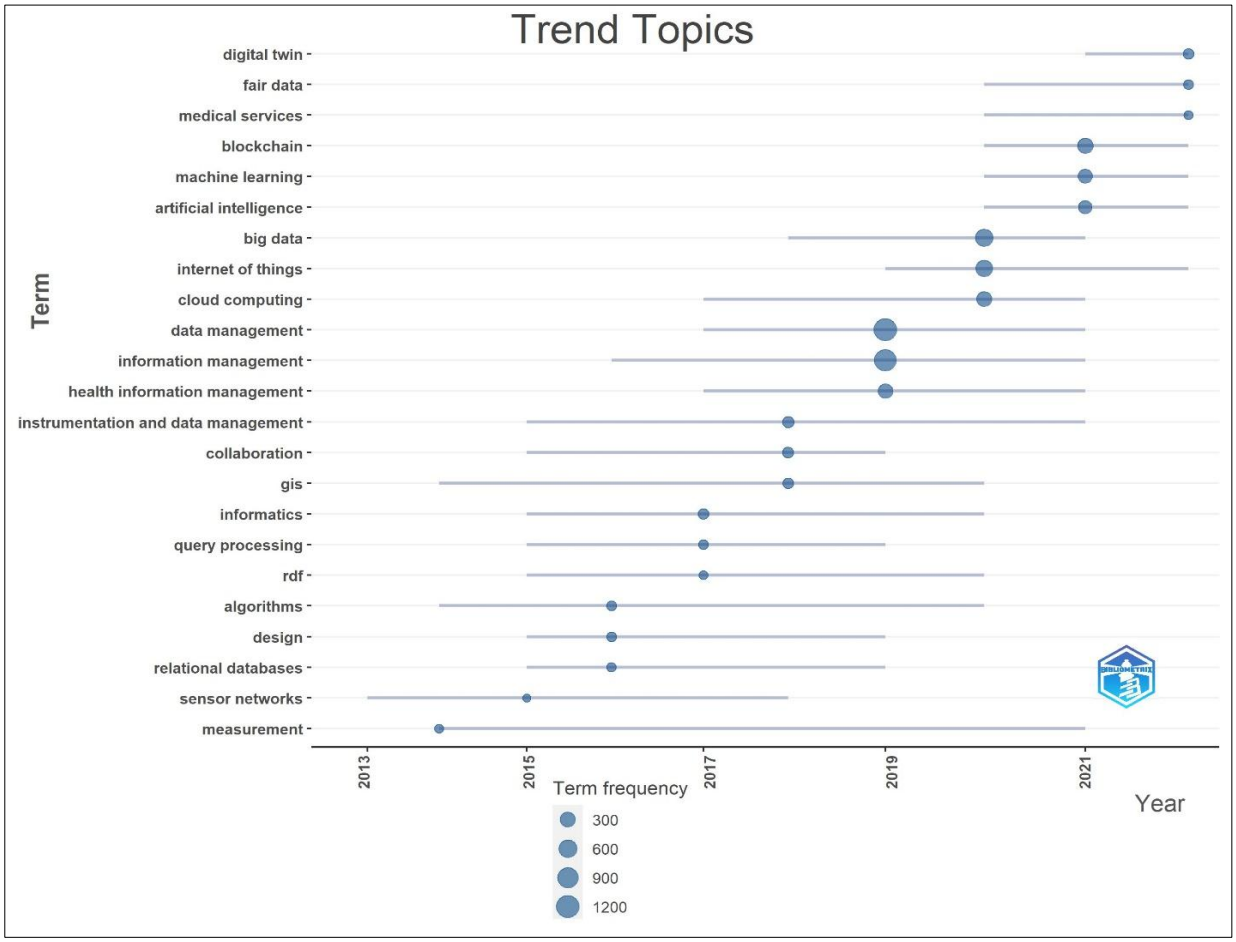

Figure 4: Trend topics in the field of information management

Discussion

The analysis of the conceptual structure of information management demonstrates that this field encompasses diverse activities aimed at managing and utilizing information and data through information technologies. The field of information management is divided into five sub-domains, including health information and technologies management, big data management, research data management, data management systems, and information technology management. Each sub-domain has evolved significantly over the last decade, demonstrating interdisciplinary collaboration, new technological integrations, and the rising importance of data-centric strategies.

Health information and technologies management is the largest cluster within the field of information management. Information management in the healthcare domain is a major global challenge. Due to the complexity and sensitivity of this field, information management in healthcare is highly challenging and requires advanced technologies and established standards. The study by Epizitone et al. (2022) also reiterated the recurring themes in this research. Historical trends of information management topics show that health topics are often older than other topics. It should be noted that the field of health and treatment has long been a leader in the use of information technology, which is one reason for the highlighted persistence of these topics in this cluster. New and highly cited topics in the field of health information management center on the COVID-19 pandemic and health informatics. The global impact of the COVID-19 pandemic attracted significant attention, and COVID-19 and pandemics were among the new topics in the study by Epizitone et al. (2022) and Luo, Wu, Niu and Huang (2022). Additionally, the field of health informatics has gained increasing importance in recent years, with a greater focus on topics such as public health informatics, clinical informatics, and healthcare data analysis. In addition to these two topics, we found that health care and quality of life will also be among the main and hot topics in the field of information management and health technologies in the coming years. The topic trend in this cluster has changed from general and basic topics to technical and systemic topics of health information management, improving the quality of health care, social medicine, telemedicine, and the impact of technology on community health and the COVID-19 pandemic. In other words, the future of health information technology management will likely involve continued advancements in technology, increased focus on health informatics, and a growing emphasis on addressing challenges related to the COVID-19 pandemic and improving the quality of healthcare

In recent years, research in big data management has experienced significant growth and transformation, as the domain has evolved in response to the rapid growth of data generated by various sources. The studies by Ragazou et al. (2023) and Singh, Banshal, Singhal and Uddin, (2015) highlight the critical role of big data analytics in transforming the field of information management. They confirm the strong connection between studies on big data management and data management systems, health information, and management technologies. Interdisciplinary research on big data, as discussed by Jin and Lee (2019), is developing in the directions of "Mathematics and Systems, and Medicine and Clinical". Several other studies, including those by Rawat and Sood (2021), Marín-Marín et al. (2019), Batistič and van der Laken (2019), Esfahani et al. (2019), Khanra et al. (2020), and Galetsi and Katsaliaki (2020), demonstrate further aspects of interdisciplinary studies in the field of big data. The present study confirms the findings of Rawat and Sood (2021), suggesting the potential expansion of topics such as the Internet of Things, blockchain, and smart cities, thereby turning them into new, achievable

research areas. Big data management topics, although relatively new compared to other clusters in information management, continue to evolve, demonstrating the significant role of information technologies and computational tools in managing and analyzing large datasets. Initially, the focus was on technical and algorithmic topics, as identified by Batistič and van der Laken (2019) and Jin and Lee (2019). However, with technological advancements, the emphasis shifted towards the topics related to data mining, data analysis, and prediction. Additionally, topics such as data security, big data analytics, and the use of machine learning for information extraction gained prominence due to the emergence of the Internet of Things and daily needs. Advancements in artificial intelligence and blockchain technology also influenced the research agenda, adding topics such as smart contracts and blockchain security. Thus, the field of big data management has undergone significant transformation and growth, encompassing interconnected topics and their ongoing evolution. It can be claimed that future advancements in big data management will involve some collaboration and integration of expertise from multiple disciplines and academic fields.

Research data management in academic environments encompasses processes such as collecting, storing, optimizing, transferring, sharing, and utilizing information and data to support research and knowledge development. This requires research data management technologies, standards, approaches, and processes to manage and share high-quality data and information while maintaining privacy. Co-occurrence analysis indicates that research data management is associated with concepts such as uncertainty, behavior, social media, future, and trust. This suggests that social relationships (collaboration networks), behavioral aspects (information-seeking behavior), and other factors related to this field should be considered in research data management. Arora and Chakravarty (2021) consider data sharing, research data management, research data, science, and metadata as the main activities of research data management. Research data management is a subfield of library and information science as Naseema and Sevukan (2022) identify its connection with library and information science through a bibliometric study of research data management. Some of the topics discussed in this field include: training and preparation of students and researchers for research data management; knowledge and skills required for data professionals; the role of libraries and librarians in the data science movement; tools, techniques, and applications of data science in various domains; data science from an information management perspective; and data science from a health science perspective (Virkus & Garoufallou, 2020; Virkus & Garoufallou, 2019; Pinfield, Cox & Smith, 2014). Research data management topics exhibit a mix of old and new topics. They have shifted from social and behavioral aspects to research data management topics in recent years, driven by technological advancements and scientific research needs. Furthermore, with the development of information science and the influence of social media, topics related to data, data dissemination, trust in data, and data-use ethics have been incorporated into research. Lastly, with the advent of open science, open data, and data science, topics such as social data and research data in academic and scientific institutions will get more attention, too.

Data management systems demonstrate how this field addresses the organization, integration, protection, analysis, and exchange of data from various sources across different scientific and industrial domains, using concepts, methods, tools, and various infrastructures. This cluster focuses more on technical and operational details in the design and implementation of data management systems, covering topics such as data management standards, practices,

patterns, and frameworks; various tools and platforms; and data quality and usability. This cluster also indicates that the use of data management systems in challenging domains such as environmental, energy, climate change, biodiversity, and bioinformatics is ever-increasing. These systems assist these domains in maintaining data value. Data management system topics evolve from old to new contexts, reflecting the significant role of scientific and industrial needs and technological advancements in shaping this field. Relatively older topics, such as the web, databases, and search, continue to receive attention and remain important for the development and improvement of data management systems. With technological advancements and evolving needs, new topics have emerged in data management, indicating that the field is still evolving and growing. The shift encompasses topics related to system design and development, pattern and model utilization, data management and integration, standards and interoperability, efficiency and sustainability, and structural models. These additions demonstrate the continuous evolution and adaptation of data management systems to meet changing requirements and technological advancements.

In the cluster we named information technology management, various topics such as management, technology, performance, information technology, information systems, innovation, and decision-making are present. The application domains within this cluster include knowledge management, supply chain management, organizations, businesses, and business intelligence. In the past, information technology management was primarily seen as a tool for improving organizational efficiency and performance. However, today, due to rapid, continuous technological and innovation-driven changes, information technology management is recognized as a strategy for creating innovative opportunities and increasing organizational value. Studies by Srivastava et al. (2021), Donthu et al. (2021), and Donthu et al. (2022) classify information management studies as more closely related to information technology management. The topics in this cluster are neither very new nor very old. However, the trend indicates an increased focus on knowledge, performance, strategy, decision-making, and innovation-related topics in the study of information technology management. Overall, the field of information management has experienced significant changes and developments in the past decade. Sharma et al. (2021) provided a clustering of information management topics in their research, and due to the long time span of their study, those topics were mostly identified as old subjects in the current research. They focused on topics relevant to data management systems and information technology management in their study.

Conclusion

The future of information management, including health information technology, big data, research data, and data management systems, is expected to be characterized by continuous advancements and interdisciplinary collaboration. There will be a growing emphasis on addressing specific challenges and emerging areas, such as the COVID-19 pandemic in healthcare, the Internet of Things and blockchain in big data management, open science and data ethics in research data management, and system design and interoperability in data management systems. Technological advancements will play a crucial role in shaping these fields, enabling organizations to extract valuable insights, improve efficiency, and drive innovation. Overall, the future of information technology management will require strategic approaches, collaboration, and adaptation to evolving needs and opportunities to effectively manage and utilize data for organizational success.

The findings of this study help scholars and decision-makers navigate emerging trends and strategic planning. The results of this study offer valuable insights for ontology engineers and developers of knowledge organization systems (KOSs), facilitating the design and refinement of ontologies in the domain of information management.

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