Research Article

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Knowledge Management in the Era of Platform Economies: Bibliometric Insights and Prospects Across Technological Paradigms

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Abstract: This study conducts a bibliometric analysis of literature on digital platform knowledge management from 2004 to 2024. Using predefined keywords, 1,787 publications were retrieved from the Web of Science Core Collection. Bibliometric tools, including R-Bibliometrix, BibExcel, and CiteSpace, were used to analyze publication trends, leading contributors, and thematic evolution. Visualization was supported by Gephi, VOSviewer, and OriginPro. Based on keyword co-occurrence clustering, temporal sequence-based associative clustering, and the "technology–economy" co-evolution paradigm, several key findings emerged. The field shows continuous growth, characterized by multidisciplinary integration and strong links to national digital economy strategies. Ten major research themes were identified, such as smart factories, virtual collaboration, and knowledge gaps. The temporal evolution reveals three main trajectories: reconstruction of core elements, development of new platform infrastructures, and expansion of practical applications. Using Perez's "technology–economy" paradigm, the study highlights potential research gaps in the current digital technology–economy synergy and proposes future directions under the "biotechnology–economy" and "physical technology–economy" paradigms. These findings enhance understanding of the field's development and offer theoretical and methodological references for future research.

Keywords: bibliometric analysis, digital platforms, knowledge management, keyword clustering, co-citation clustering

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1 Introduction

The "technology–economy" co-evolution paradigm, proposed by Perez (2002), posits that newly developed general-purpose technologies and ideas in the field of science and technology gradually diffuse into the economic domain, thereby initiating a process of mutual adaptation and transformation between technological and economic systems. This paradigm has been validated through four major technological revolutions and associated economic cycles (Epicoco, 2021; Perez, 2010) and possesses significant methodological importance (Chen, 2023). The Fifth Technological Revolution, emerging in the 21st century, is characterized by the rise of digitalization, informatization, and intelligent technologies. The fusion of these technologies with economic activities has led to the creation of a new economic model driven by data, supported by platforms, and coordinated through networks, with the platform economy being one of its most representative manifestations (Acs et al., 2021; Saeidi Aghdam et al., 2025). Amid global challenges such as the COVID-19 pandemic, high inflation, and slowing economic growth, the platform economy demonstrated remarkable resilience: from 2019 to 2022, it achieved continuous positive growth. By 2022, the total market capitalization of listed internet platform companies with a market capitalization of at least $10 billion had increased by 60.5% year-on-year. This rapid growth has positioned the platform economy as one of the most innovative sectors of the global economy, particularly in contrast to the traditional real economy (Su et al., 2023).

Armstrong (2006) conceptualized a platform as "an organizational form that facilitates functional activities among two or more distinct groups." In internet platform research, platforms are increasingly understood as "organizational forms of virtualized, functional spaces." Within platform knowledge management studies, platforms serve as carriers of knowledge management. In this context, "knowledge" refers to the elements generated and utilized within the platform economy, encompassing a wide range of knowledge entities such as information, data, theories, processes, and intellectual property, and involving diverse knowledge actors including individuals, enterprises, groups, and organizations (Dann et al., 2022; Sheel & Edalatpanah, 2024). “Knowledge Management” (KM) pertains to the dynamic integration of internal and external systems, business processes, and technological relationships associated with knowledge carriers (platforms), aimed at maximizing performance (Tranfield et al., 2003). Research on knowledge management within platform economies is thus both a critical source of competitive advantage and a determinant of the future trajectory of platform-based economic systems, underscoring its frontier nature and strategic importance (Chi et al., 2025; Liao et al., 2024; McKnight et al., 2023).

Research on digital platform knowledge management has produced a growing body of work. For example, De Reuver et al. (2018) examined the shift in functionality of digital platforms as information systems and highlighted the challenges associated with platform architecture complexity; Ahmed et al. (2019) explored how social media platforms facilitate knowledge sharing and communication at the organizational level; Vaska et al. (2021) emphasized the role of sharing platforms in digital transformation (DT), demonstrating their significance in management research; Massa et al. (2023) investigated big data management technologies from the perspective of enterprises to enhance knowledge management performance. These studies reveal that digital platform knowledge management exhibits strong interdisciplinary characteristics. Moreover, due to the rapid pace of technological innovation and increasingly frequent user interactions, research outputs in this area are evolving swiftly and diversifying. Existing review studies in this field primarily focus on the knowledge outputs and emerging trends within computer science and information technology. They examine key components of science and technology management and services, including research institutions, human resources, and scientific achievements (Bhatti et al., 2024; Leong et al., 2024; Liu et al., 2024). The aim is to construct large-scale knowledge graphs that map the relationships among diverse entities, thereby enhancing technological insight and service capabilities and providing multimodal decision support across various domains.

Bibliometric analysis is an important method for conducting literature reviews. It uses bibliographic metadata, including titles, keywords, authors, disciplines, publication journals, and references (Rahimi et al., 2024; Yang et al., 2020), to describe and evaluate the structure of the literature, thereby identifying potential research gaps and clarifying knowledge boundaries (Mukherjee et al., 2022; Naskar & Lindahl, 2025). However, bibliometric reviews in the field of platform knowledge management remain scarce and predominantly concentrate on specific subdomains such as social networks and online learning platforms (Anugerah et al., 2022; Djeki et al., 2022). For instance, Agostini et al. (2020) conducted a bibliometric analysis of literature on inter-organizational knowledge management; Pai et al. (2022) examined research on the application of artificial intelligence within knowledge management platforms; and De Bem Machado et al. (2022) analyzed the interrelations among knowledge management, DT, and Industry 4.0, highlighting the critical role of DT in the evolution of knowledge management. Recent studies have also examined the DT of business models driven by digital platforms and digital servitization (Wang et al., 2024). In addition, Li et al. (2024) provided a comprehensive review of research on digital platform knowledge and information management, emphasizing deeply integrated application scenarios. Given the rapid development of digital platforms and the growing importance of technological innovation in shaping economic activities, research on platform knowledge management has become increasingly prominent, characterized by interdisciplinary collaborations, expanding research boundaries, and a growing volume of scholarly output.

Therefore, this study employs a bibliometric approach, integrating clustering analysis with time-series analysis, to systematically identify research clusters and assess the current state and progression of the field. The primary contribution of this study lies in uncovering the development and application trends of knowledge management within digital platforms, thereby clarifying potential directions for future research. In addition, by applying associative clustering based on time-series analysis, the study reveals the progression of research in this field and uncovers the underlying intellectual structure. Moreover, grounded in the “technology – economy” paradigm, this study seeks to identify potential research gaps and propose directions for future research. All figures in this manuscript were generated by the authors based on the original experimental data.

The remainder of this paper is organized as follows. Section 2 introduces the data collection and outlines the bibliometric methods. Section 3 provides an overview of the descriptive analysis results. Section 4 presents the major clusters, interprets them through the lens of the technology–economy paradigm, and discusses future research directions. Finally, Section 5 concludes the study by summarizing the main findings and practical implications.

2 Materials and Methods

2.1 Defining Appropriate Search Terms

A combination of two sets of keywords was used to retrieve relevant literature: "platform economy" AND "knowledge management." First, the concept of "platform" was interpreted as internet-based functional infrastructures (Zhang & Zhao, 2022). Accordingly, the search included terms such as "online community," "virtual community," "social media," "internet+," "digital" or "Internet of Things (IoT)" (Krishen et al., 2021; Xia et al., 2023). Second, knowledge management was defined as the study of knowledge acquisition, storage, transfer, sharing, creation, and application (Akhavan et al., 2016; Gaviria-Marin et al., 2019). Thus, the search formula for "knowledge management" is as follows:

TS = (knowledge NEAR/0 (management OR acquisition OR creation OR integration OR transfer OR share OR diffusion OR spillover OR application OR use OR adoption OR storage OR retrieval OR bank OR portal OR organization OR exchange))

2.2 Data Sources and Data Cleaning

The bibliographic data for this study were sourced from the Web of Science (WoS) Core Collection database. The initial search covered the period from January 1, 2001, to December 31, 2024. The earliest relevant study identified was Rochet and Tirole (2003) pioneering work on platform studies from the perspective of new industrial organization forms. However, since only one relevant article was found in 2003, the final analysis of this study focused on the period from January 2004 to December 2024. Although a lag in indexing 2024 publications may exist, the small proportion of such records does not impact the recognition of research subjects, hotspots, or thematic trend transitions in our big-data analysis. Therefore, the inclusion of 2024 data does not bias the study's conclusions. A total of 3,777 documents were initially retrieved. After manual screening for scientific relevance and academic quality, 1,566 documents were excluded. These included editorials, book reviews, meeting notices, non-peer-reviewed magazine articles, and duplicate records across different document types.

In addition, 37 non-English publications were removed. A further 387 irrelevant documents, such as news reports and records without author information, were also excluded. The final sample comprised 1,787 documents published between 2004 and 2024 (Figure 1).

2.3 Research Process

This study conducted a bibliometric analysis of platform knowledge management research. The overall research framework is illustrated in Figure 2. First, we examined contributions to the field from the perspectives of academic disciplines, countries, and publication sources. Second, using keywords and citation data as the basis, we performed keyword co-occurrence analysis and co-citation clustering analysis, following the bibliometric procedures outlined by Donthu et al. (2021). These two approaches were used jointly to trace the evolution of

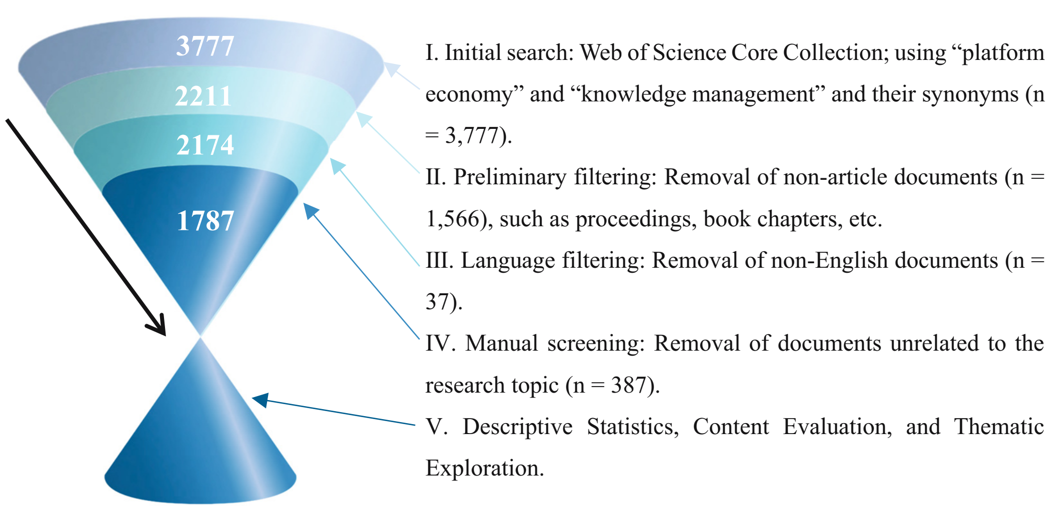

Figure 1: Data retrieval and processing procedure.

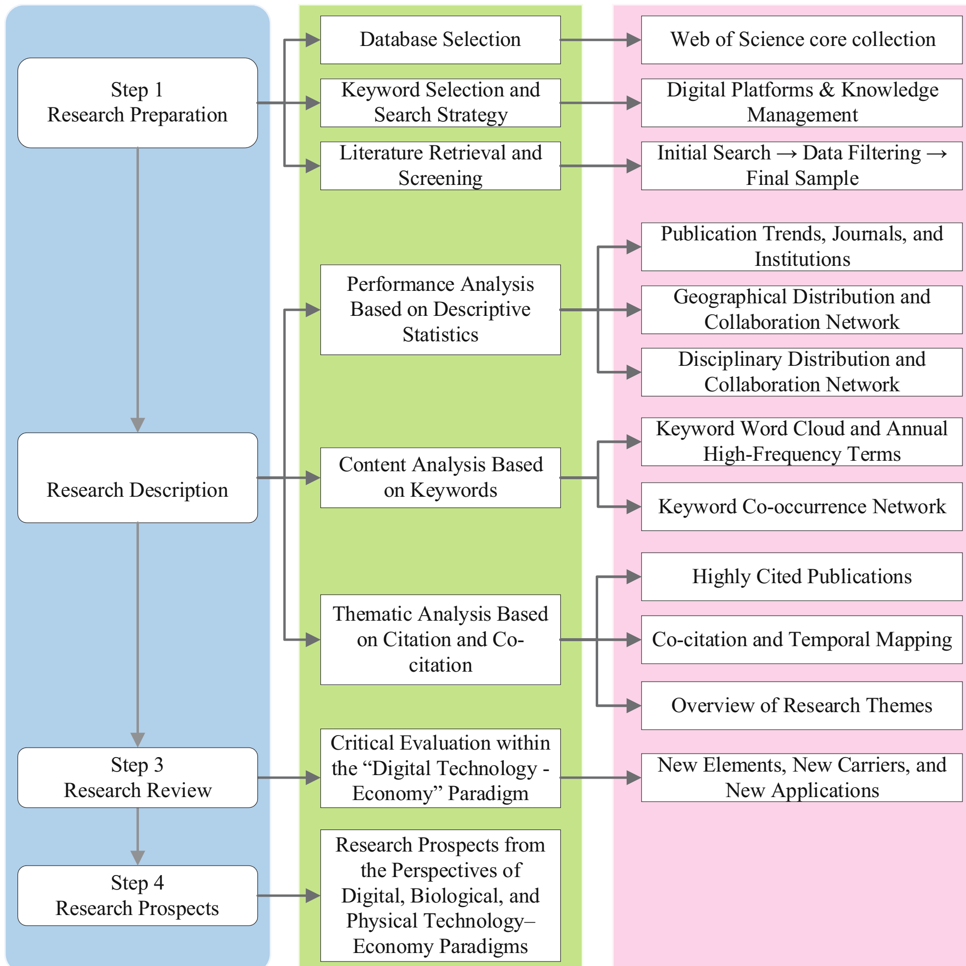

Figure 2: Research framework.

research communities and thematic developments in this domain over the past two decades. Third, drawing on the "digital technology – economy" paradigm, we conducted a research evaluation to identify novel elements, carriers, and applications that may drive future advancements. Finally, we explored potential research directions for platform knowledge management within the broader contexts of the "biotechnology – economy" and "physical technology – economy" paradigms. Throughout the study, multiple software tools were used for bibliometric analysis and visualization, including R-Bibliometrix, BibExcel, CiteSpace (V.6.2.R4), and VOSviewer. R-Bibliometrix is an R package designed for bibliometric analysis, supporting the import and conversion of bibliographic data in formats such as BibTeX, WoS, and Scopus. It enables quantitative analysis of the practice, regional distribution, and structural characteristics of scientific literature. BibExcel's core function is co-word analysis, which constructs co-citation, coupling, or co-word matrices by counting certain targeted terms (e.g., keywords, subject terms) to reveal relationships within a research field. CiteSpace is an open-source citation visualization tool based on the Java platform that generates structured and dynamically evolving knowledge maps. Building on these tools, VOSviewer provides enhanced visualization of literature linkages and citation relationships, helping readers intuitively understand research hotspots, paradigms, and collaboration patterns within a discipline. The combined use of these bibliometric tools can better reveal the state of the literature and trends of research transformation in a given field.

To further capture the dynamic evolution of research themes, time-series analysis was integrated with cluster analysis. This approach enabled us to not only classify thematic clusters but also examine their development trajectories over time. Grounded in the "technology – economy" paradigm, this framework facilitated the identification of emerging topics and potential research gaps.

3 Results

3.1 Publication Contributions

3.1.1 Publication Trends, Journals, and Institutions

A total of 1,787 documents were included in the sample for this study. Analysis of annual publication trends based on WoS data shows a steady increase in the number of publications since 2015, with an average of 198 publications per year from 2018 to 2024. This growth trend closely aligns with the global development of the platform economy across various countries. In total, these 1,787 documents received 60,728 citations between 2004 and 2024, with annual citation counts also increasing year by year. Notably, citations have grown exponentially since 2018. When comparing citation impact across countries, the top five are China, the United States, the United Kingdom, Spain, and Italy. These publications appeared in 807 different journals. Among them, the top 10 journals published a total of 293 articles, accounting for 16% of the entire dataset. Of these, seven are ranked as Q1 journals (top 25% based on the 3-year average Journal Impact Factor, JIF), reflecting the field's strong presence in leading scientific outlets (Table 1). In terms of institutional contributions, the top 10 publishing institutions were predominantly universities, with the University of Turin (Italy) being the most active. Additionally, Italian scholar Del Giudice and Swedish scholar Manlio were the most prolific authors, each contributing nine papers. These results reflect the rapid growth and global expansion of research on platform knowledge management, particularly since 2015. The observed alignment between the publication volume and the global development trajectory of the platform economy highlights the increasing academic attention to this field. The fact that 7 out of the top 10 journals publishing related work are Q1-ranked demonstrates the field's strong connection to the scientific frontier.

3.1.2 Geographical Distribution of Literature and Collaborative Networks

In this study, we utilized the R-Bibliometrix tool to analyze the geographical distribution of publishing countries and their collaborative networks. The 1,787 documents in our sample involved a total of 106 countries or regions. The analysis revealed several key distribution characteristics (Figure 3).

First, geographically, the majority of publications originated from the Northern Hemisphere, particularly North America, East Asia, Western Europe, and Central Europe. This supports Paul Langley's conclusion that global platform-based business models are primarily concentrated in the Global North (Langley & Leyshon, 2021). Second, in terms of total publications by country, China (903 publications) and the United States (701 publications) lead the field, far ahead of other countries. This dominance can be attributed to China's focus on new economic models in the internet era and its national development strategy emphasizing technological innovation (Jin et al., 2023). In the U.S.A., rapid application of Internet and information technology innovations, especially in areas such as technological innovation platforms and social platforms, has led to a substantial volume of academic output. Third, the volume of national publications is closely correlated with the level of platform economy development. Data indicate that the U.S.A. and China rank first and second in platform economy size, valued at $6.8 trillion and $2 trillion, respectively (Acs, 2023). Notably, the top 10 publishing countries in this study closely mirror the top 10 economies in terms of platform economy size, though their internal rankings vary slightly (Table 2). This alignment reinforces the

Table 1: Journal publication contribution

#	Sources	Publications	JIF	JIF Quartile
1	Sustainability	77	3.9	Q2/Q3
2	Journal of Knowledge Management	32	7	Q1
3	IEEE Access	31	3.9	Q2
4	Technological Forecasting and Social Change	28	12	Q1
5	Expert Systems with Applications	26	8.5	Q1
6	Journal of Medical Internet Research	22	7.4	Q1
7	Computers in Human Behavior	21	9.9	Q1
8	Sensors	20	3.9	Q2
9	IEEE Internet of Things Journal	19	10.6	Q1
10	Journal of Cleaner Production	17	11.1	Q1

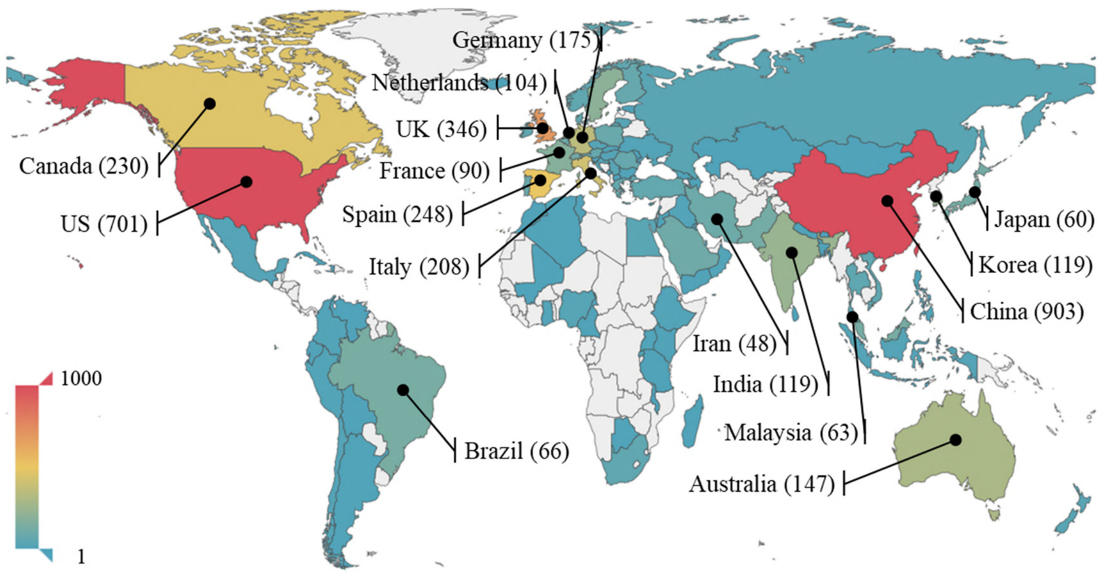

Figure 3: Geographical distribution of publishing countries. Source: Exported from pyecharts.

argument that scientific research outputs in these countries are strongly aligned with their economic practices.

The author collaboration network is constructed by treating each author's country as a node, with co-authorship relationships represented as edges. The weight of each edge is determined by the frequency of collaboration between countries. Based on a Boolean-based formula (equation (1)), the country-level collaboration network was generated (Figure 4).

$$a(o_i,\ o_j) = \begin{cases} 1, \text{Author country } (o_i) \text{ has a co} \\ \quad - \text{authorship with author country } (o_j) \\ 0, \text{Author country } (o_i) \text{ has no co} \\ \quad - \text{authorship with author country } (o_j). \end{cases} \tag{1}$$

The global collaboration structure in platform knowledge management, as illustrated by the network, is centered around several key nodes, namely China, the United States, the United Kingdom, and countries in Western Europe. Specifically, China maintains frequent collaborations with the United States, the United Kingdom, Australia, and Canada. The United States primarily collaborates with China, Canada, South Korea, the Netherlands, Italy, Germany, and India. The United Kingdom, in addition to its collaborations with China and the United States, is more strongly connected to other European countries such as Italy, Sweden, and France. Notably, within the Asian research network, countries like China, South Korea, and India exhibit close collaborative ties with North America. In contrast, countries such as Malaysia and Singapore appear more isolated, showing

Table 2: Top 10 countries by publication output and platform economy size

Country	Publications	Ranking by publication volume	Ranking by platform economy size	Number of listed platform enterprises above designated size
China	903	1	2	34
U.S.A	701	2	1	86
U.K	346	3	3	6
Spain	248	4	7	1
Italy	208	5	10	0
Germany	175	6	5	3
Korea	119	7	5	3
Canada	230	8	7	1
Australia	147	9	7	1
India	119	10	3	6

Figure 4: Collaboration network among countries. Source: Exported from R-Bibliometrix.

fewer partnerships with countries outside the region. In addition, Australia has established relatively stable collaborative relationships with India, China, and several Western European countries.

3.1.3 Disciplinary Distribution of Literature and Collaboration Networks

The WoS database currently classifies journals into 252 disciplinary categories. Literature is categorized into these disciplines based primarily on the subject areas of the journals in which the articles are published, as well as the subject descriptors provided by the authors themselves. In this study, the 1,787 sample documents span 174 WoS disciplines, with each article associated with an average of 1.95 subject categories. The top 20 disciplines by publication volume are illustrated in Figure 5(a). The five most represented disciplines, listed in Table 3, account for 59% of the total publication volume.

To examine disciplinary collaboration within the field, a disciplinary collaboration network was constructed. The full network, based on all sample data, comprises 153 nodes and 421 edges. The thickness of each edge reflects the frequency of collaboration between two disciplines. To emphasize stronger and more meaningful collaborations, a threshold was applied: only connections with a collaboration frequency greater than seven were retained. This filtering yielded a simplified version of the disciplinary collaboration network (Figure 5(b)), containing 41 nodes and 136 edges. The visualization highlights the ten most active disciplines in terms of collaborative activity. The closest disciplinary collaborations and their respective frequencies are presented in Table 4.

The most active multidisciplinary collaborations are observed in the fields of computer science and information management. The top ten disciplines with the highest frequencies in the collaboration network are listed in Table 5. These collaboration patterns illustrate the frontier nature of research in the field of platform knowledge management, with its development closely linked to innovations in modern network, information, and computer science disciplines.

3.2 Keyword Analysis

3.2.1 Keyword Word Cloud and Annual High-Frequency Terms

Based on the analysis of 1,787 sample documents, a total of 5,567 unique keywords were identified. A keyword word cloud was generated using the R-Bibliometrix package, as shown in Figure 6. The analysis of high-frequency keywords reveals three notable patterns: First, there is a high degree of overlap between the high-frequency keywords and the initial search terms. Among the top 40 keywords, 11 match the search terms, including “IoT” (135),

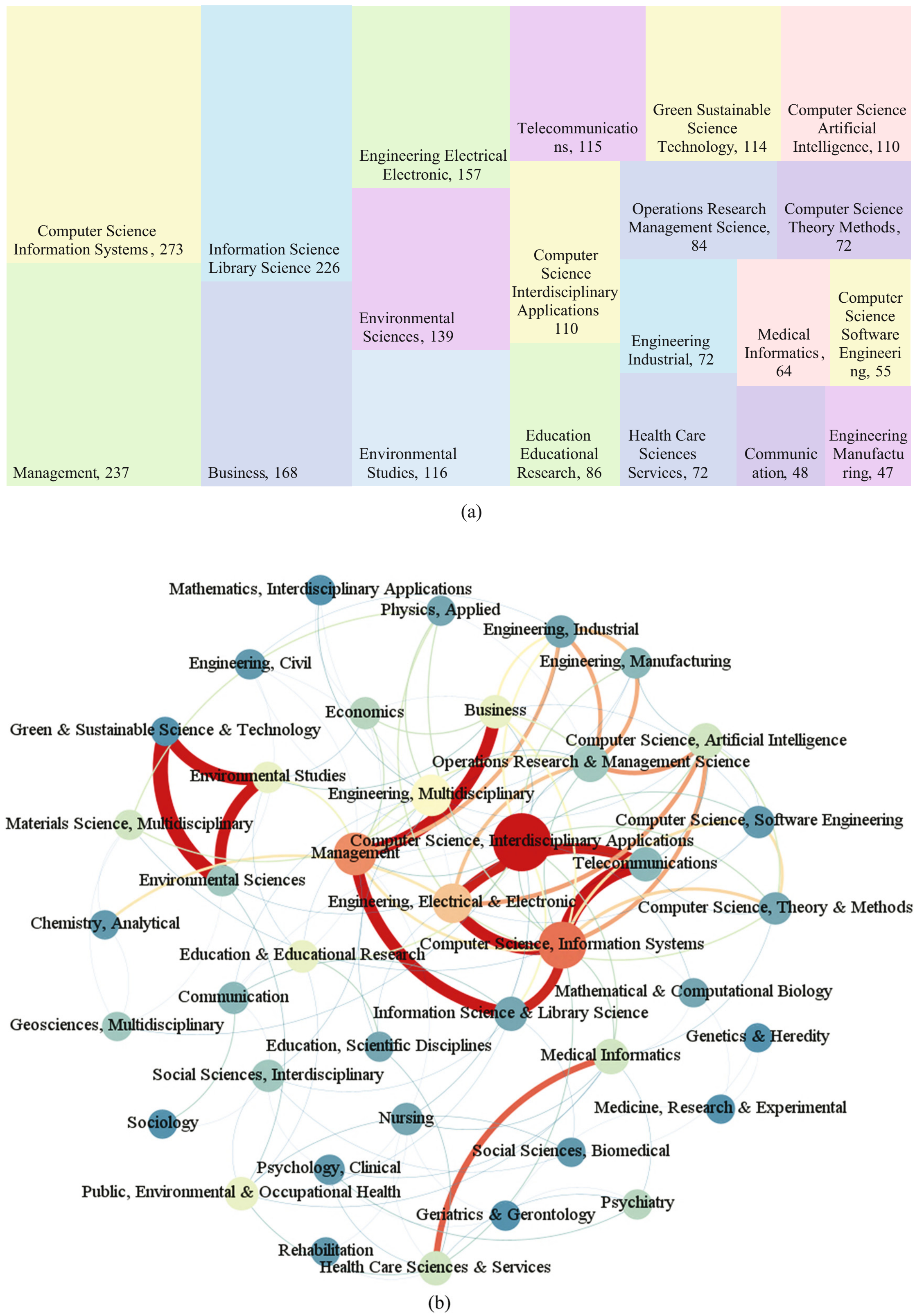

Figure 5: Overview of disciplinary structure in platform knowledge management: (a) top 20 disciplines by publication volume, and (b) network of disciplinary collaboration. Source: (a) exported from MS Excel) and (b) exported from Gephi.

Table 3: Top five disciplines by publication volume

Discipline	Volume
Computer science information systems	273
Management	237
Information science library science	226
Business	168
Engineering electrical electronic	157
Total	1,061

"Internet" (134), and "knowledge sharing" (111). Second, some keywords reflect recent global developments and major events. Examples include "circular economy" (58), "Industry 4.0" (32), and "COVID-19" (30), indicating that the research field is responsive to broader international trends. Third, the keyword trends closely follow the evolution of digital technologies. Since 2014, high-frequency terms have consistently centered around concepts related to digitalization and informatization. From 2020 onward, terms related to intelligent technologies, such as "big data" (37) and "innovation" (37), have increasingly appeared among the most frequent keywords.

Annual keyword frequency statistics further show that from 2007 to 2017, "data mining," "e-commerce," and "distance learning" frequently ranked among the top three. In particular, "virtual community" remained a research hotspot between 2010 and 2022, while "information technology" maintained high relevance over a span of 12 consecutive years (2008–2020).

3.2.2 Keyword Co-Occurrence Map

Keyword co-occurrence analysis is widely used to identify relationships among keywords in large datasets. In constructing a keyword co-occurrence network, keywords are treated as nodes, and co-occurrence between any two keywords establishes an edge. The frequency of co-occurrence serves as the weight of the edge. When a keyword frequently co-occurs with several others, it suggests that the corresponding documents are related in terms of research content. If multiple keywords frequently co-occur or form specific clusters, the associated documents are likely to share common thematic areas.

Table 5: Top 10 disciplines by frequency in the collaboration network

Discipline	Frequency
Computer science, information systems	418
Engineering, electrical & electronic	303
Management	293
Environmental studies	214
Green & sustainable science & technology	213
Telecommunications	203
Business	186
Information science & library science	181
Computer science, interdisciplinary applications	163
Environmental sciences	139

In this study, keyword co-occurrence relationships were visualized using VOS viewer (Figure 7). The analysis revealed that between 2004 and 2024, the co-occurrence network contained 5,567 nodes (keywords). Of these, 202 nodes had a co-occurrence frequency of five or more, resulting in 1,954 edges and a total link strength of 3,192. Among the top 10 keywords with the highest co-occurrence frequency, "knowledge management" frequently co-occurred with "Internet" (20), "Big Data" (12), and "knowledge sharing" (10), indicating that research in platform knowledge management often integrates digital platform concepts with knowledge processes. Additionally, the IoT showed high co-occurrence frequencies with terms such as "knowledge transfer" (12), "training" (10), "privacy" (10), and "security" (10). As a core driver of the third wave of the information technology revolution, IoT has attracted significant scholarly attention, particularly concerning issues of user information exchange, privacy protection, and data security.

3.3 Co-Citation Analysis

3.3.1 Highly Cited Literature

In citation analysis by academic discipline or research field, local citations refer to citations within a specific

Table 4: Most frequent discipline co-occurrence pairs

Rank	Discipline 1	Discipline 2	Co-occurrence frequency
1	Environmental sciences	Green & sustainable science	104
2	Green & sustainable science & technology	Environmental studies	83
3	Environmental sciences	Environmental studies	79

Figure 6: Keyword word cloud. Source: Exported from https://www.weiciyun.com.

area of specialization. These reflect a document's influence within its own field. In contrast, global citations measure a document's broader impact across all disciplines indexed in the WoS database. Figure 8 displays the citation bursts of the top 10 articles from 2004 to 2024.

Table 6 lists the top 10 most frequently cited articles in both local and global contexts. Notably, six articles appear in both rankings. Among them, the highly cited work by Hsu and Lin (2008) ranks near the top in both local and global citation counts. Through empirical analysis, this article investigates participants' attitudes in blogging communities, highlighting positive correlations between platform cultural identity, perceived ease of use, enjoyment, and knowledge-sharing behaviors – explaining 83% of the variance in user engagement. The study's theoretical contribution lies in extending Ryan and Deci's (2000) self-determination theory by proposing affinity-based motivational needs as an additional dimension. This perspective has since been widely adopted in research on "community ecology." Furthermore, the article offers valuable practical implications for organizational theory related to virtual communities and digital platforms. As a result, it became the most globally cited article and the fourth most locally cited within the field of knowledge management. The second most globally cited article, authored by Oztemel and Gursev (2020), proposes a framework for applying collaborative innovation technologies from IoT platforms to the context of Industry 4.0. Despite its recent publication, the model has been widely cited and applied in subsequent studies. The most locally cited article is by Lin et al. (2009), which was the first to demonstrate the positive impact of trust on knowledge-sharing behavior. The article identifies trust as a key element in platform-based knowledge exchange and reports a local-to-global citation (LC/GC) ratio of 6.08%, establishing it as a landmark study in the field.

The selection of keywords in academic literature is inherently subjective, shaped by factors such as the researcher's background, research focus, reference to classical methodologies, and individual innovation. Keywords often reflect the author's personal choices and thematic emphasis. In contrast, citation-based metrics provide an objective foundation for assessing research development.

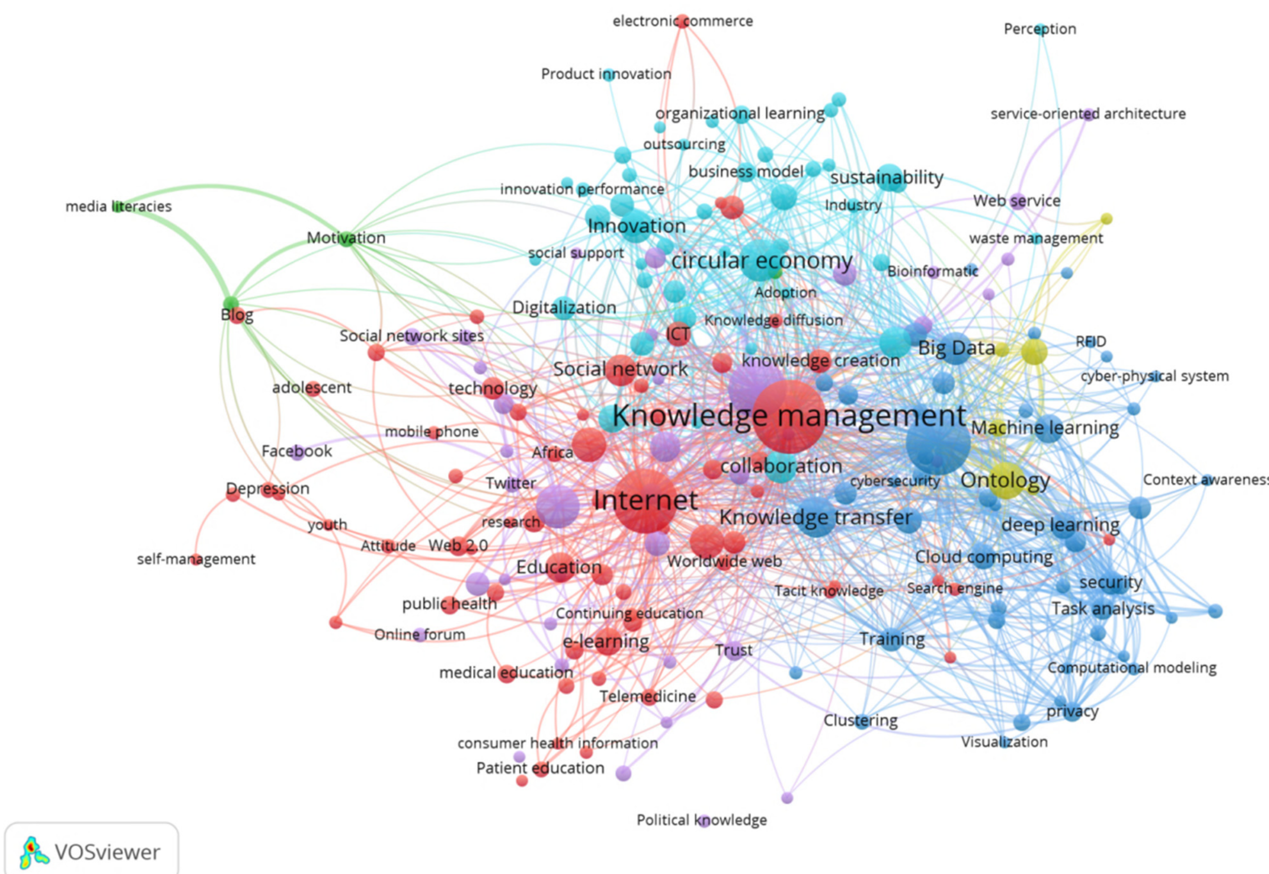

Figure 7: Keyword co-occurrence network. Source: Exported from VOSviewer.

By significantly reducing subjectivity, citations better reflect the cumulative and verifiable nature of scientific progress.

Therefore, this study adopts citation-based indicators as a primary analytical entry point, while also incorporating keyword co-occurrence and disciplinary collaboration to observe thematic structures and emerging trends. A review of research topics is conducted based on similarity assessments and cluster analysis. When two articles are cited together by a third article, they are said to have a co-citation relationship. The entire set of such relationships across a research domain constitutes a co-citation network (Small, 1977). To analyze the structural characteristics of these networks, topological data analysis, a method derived from applied mathematics, can be employed (Uray et al., 2024). Based on parameters such as interaction frequency, edge strength, and network density, clusters can be identified within the co-citation network (Majumdar & Laha, 2020). Analytical tools such as Gephi (using the Louvain algorithm) and CiteSpace (using the log-likelihood ratio (LLR) algorithm) operationalize these topological techniques for cluster detection and visualization.

3.3.2 Co-Citation Clustering and Time-Series Mapping

First, we constructed a co-citation network based on the sample literature. In this network, each node represents the first author of a cited paper, effectively serving as a proxy for the paper itself. An edge between two nodes indicates that the corresponding papers were co-cited by the same article, and the co-citation frequency n represents the strength of the co-citation relationship. The color of the edges in the network corresponds to the year in which the co-citation first occurred. As the number of citations increases over time, this is visually reflected by an increase in node size. Using citation data from 1,787 sample articles and their references between 2004 and 2024, we constructed a co-citation network comprising 566 nodes and 1,713 edges.

For clustering analysis, a variety of tools are available. In this study, we employ CiteSpace V.6.2.R4, which applies the LLR algorithm to identify and extract research topic clusters. This approach offers several advantages. First, it uses the g-index rather than the traditional h-index, accounting for both the number of publications and their

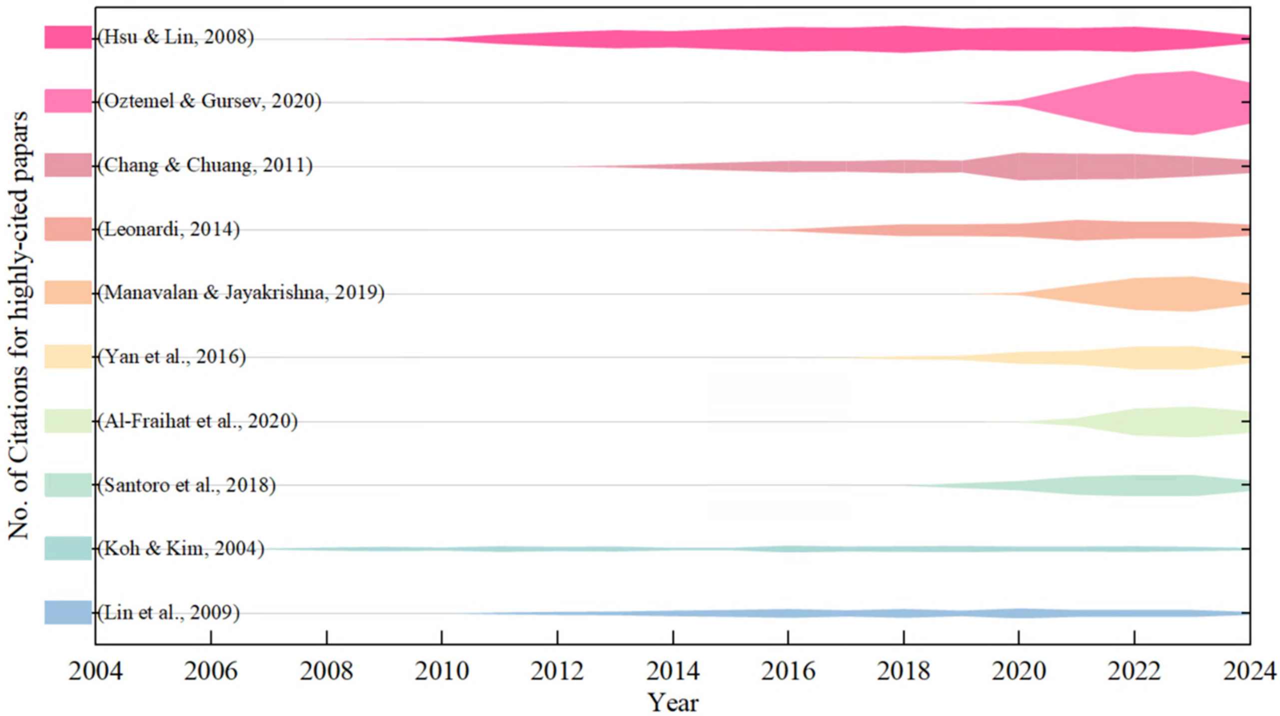

Figure 8: Time series of WoS citations.

Table 6: Locally and globally highly cited articles in the WoS

Cites	Local citations (Rank)	Global citations (Rank)
Lin (2009)	18 (1)	296 (10)
Santoro (2018)	17 (2)	311 (8)
Chang (2011)	15 (3)	626 (3)
Hsu (2008)	14 (4)	1004 (1)
Koh (2004)	10 (5)	304 (9)
Leonardi (2014)	9 (6)	413 (4)
Uden (2017)	9 (6)	
Bresciani (2018)	9 (6)	
Chen (2007)	7 (9)	
Andersson (2012)	7 (9)	
Oztemel (2020)		721 (2)
Manavalan (2019)		387 (5)
Yan (2016)		328 (6)
Al-Fraihat (2020)		312 (7)

citation counts. This reflects an author's influence within a cluster, rather than relying solely on node centrality. Second, the *k*-value parameter can be adjusted according to the sample size, which helps eliminate redundant information and enhances the structural clarity of the network (Chen et al., 2010). Additionally, the LLR algorithm supports multidimensional scaling, enabling more nuanced visualizations of thematic structures. After clustering, the algorithm integrates keyword information, combining statistical methods with substantive topic analysis. This approach goes beyond simple publication counts, offering a more in-depth understanding of the research content and topic evolution.

Considering the sample size, we applied medium-density parameters for clustering the co-citation network, using the following settings: g-index (k = 30), LRF = 3.0, L/N = 10, LBY = 5, and e = 1.0. After clustering, the network density was calculated as 0.0107. Isolated nodes were excluded, resulting in a final co-citation network comprising 35 clusters, among which the top 30 clusters accounted for 91% of all nodes (519 nodes). The modularity value (Q = 0.8403) and average silhouette score (S = 0.9431) both surpass the standard thresholds for effective clustering (Q > 0.3 and S > 0.7) (Chen et al., 2015), suggesting a well-structured and statistically robust clustering outcome. Following the methodological guidance of Geng et al. (2023) and Zhang et al. (2022), we selected the top 10 clusters (each with at least 18 nodes) for visualization (Figure 9).

While the clustering results generated by the software are based on algorithmic boundary values and provide statistical groupings, they primarily indicate similarity in citation patterns among documents within each cluster. However, such results do not inherently confirm conceptual coherence within the clusters, such as shared themes or research content. Therefore, a more robust and scientifically valid approach to uncovering the substantive focus of the literature involves the integrated analysis of multiple knowledge units, particularly the combination of co-citation data with high-frequency keywords. Based on the co-citation clustering results, and in order to highlight the core research themes in this field, we followed the approach used in previous studies (Wang et al., 2025) and reported only clusters with a size greater than 15 (i.e., those containing more than 15 references). A total of 10 clusters are summarized in Table 7.

It is important to note that academic citations are used to mark the relationships between the borrowing, use, and development of scientific achievements. They reflect the historical inheritance and related expansion within a research field. When two papers published at different times are cited by the same paper, the connection between their publication times forms a co-citation temporal link. This edge signifies the continuation, inheritance, and borrowing between the two papers over time. Using BibExcel and CiteSpace, we can generate a co-citation clustering and its time series map for the period from 2004 to 2024 (Figure 10). It should be noted that for some high-frequency co-cited papers within a cluster, the color of the node corresponds to the year of co-citation (if multiple co-citation years appear, the node will display the color of the most recent year due to overlapping). In the graph creation process, we employed burst detection, as the field's most highly cited papers were mainly from 2019 to 2022. Therefore, some of the high-frequency co-cited papers have node colors representing the burst citation period of 2019–2022.

4 Discussion

4.1 Research Topic Overview

Research has shown that papers with higher co-citation frequencies tend to have similar research topics (Small, 1973). The reason for this is: on one hand, the accumulation of co-citation relationships directly reflects the attention that literature pays to a particular research topic (Chen, 2006). By comparing the keywords within the clusters, we can confirm or discover the research themes in the clusters; on the other hand, core highly cited papers are continually cited across different years, which corresponds to

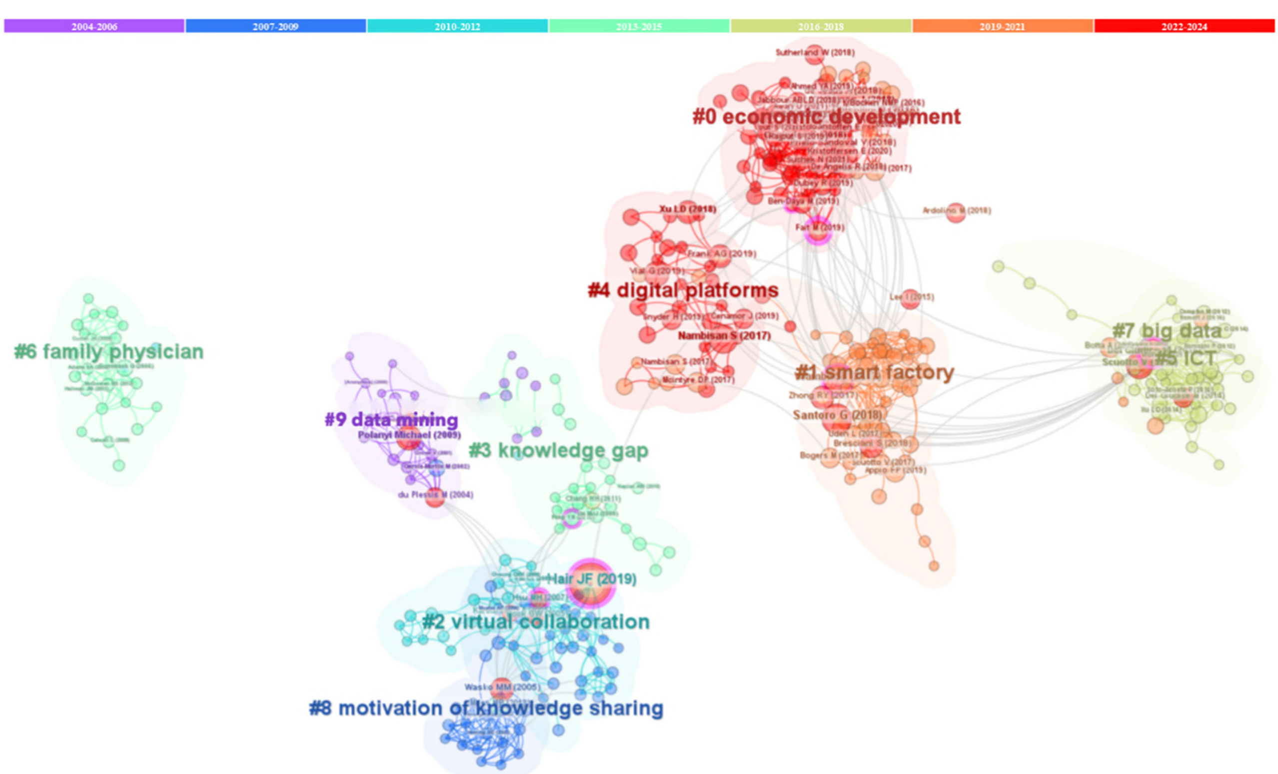

Figure 9: Clustered co-citation network of cited references. Source: Exported from CiteSpace.

Table 7: Summary of co-citation clusters: labels, node counts, and high-frequency keywords

Clusters	Silhouette	Size	Average year	High-frequency keywords within clusters
#0 Economic development	0.904	73	2019	Circular economy, sustainable development, supply chain, collaboration
#1 Smart factory	0.903	52	2017	Smart factory, industry 4.0, big data, cyber-physical production systems, business analytics
#2 Virtual collaboration	0.85	49	2006	Trust, social influence, blog, wiki media, organizational (SCT/PLS)
#3 Knowledge gap	0.983	35	2007	Knowledge gap, virtual community, knowledge sharing, knowledge sharing activity, system quality
#4 Digital platforms	0.941	34	2019	Digital platforms, knowledge integration, DT, circular economy, digital technologies
#5 ICT	0.977	34	2015	Information and Communications Technology (ICT), open innovation, SMES, smart city, knowledge creation
#6 Family physician	1	24	2010	Family physician, general practice, social media, crowdsourcing, ethics
#7 Big data	1	21	2014	Big data, internet of things, water management, interoperability, data analytics
#8 Motivation of knowledge sharing	0.997	20	2005	Motivation, free disclosure, blogs, secrecy, contingency factors
#9 Data mining	0.966	18	2002	Data mining, market segmentation, customer knowledge management, customer relationship management (CRM)

the inheritance and development of research results (Waltman & Van Eck, 2012). The disappearance of citations for certain papers also indicates the maturity or shift of specific research hotspots. This study, based on the conclusions from the co-citation clustering's bibliometric analysis, summarizes the top 10 clusters and identifies the following research themes.

4.1.1 Platform Economy Models and Digital Knowledge Management

The platform economy model, along with the rapid development of modern digital, informational, and intelligent technologies, presents increasingly large, multimodal, and real-time digital platform (community) knowledge activities. These include contexts like the 24/7 economy, spatial economy, gig economy, and ecological economy (Hossain et al., 2024; Kirchherr et al., 2017; Korhonen et al., 2018; Zhu et al., 2024). From a methodological perspective, the impact of new technologies on knowledge management is analyzed, including their influence on knowledge management processes, knowledge learning methods, etc. Digitalization is viewed as a mindset, while informatization serves as a technological tool, and DT changes the attributes of knowledge management under new economic contexts (Geissdoerfer et al., 2017). Overall, the current trajectory of economic development clearly reflects a paradigm of collaborative development integrating modern science and technology with the economy.

4.1.2 Platform Knowledge Management in Smart Factories

The increasing degree of digital technology integration and the new demands posed by the Industry 4.0 revolution have driven the development of "smart factory" operational models, making coordination within production systems a major research hotspot within this thematic cluster (Shao et al., 2021). At the same time, as platforms undergo DT, the study of knowledge elements and environmental influences on platforms has also become a significant research focus. A key reference, Santoro et al. (2018), investigates the importance of knowledge management systems (KMS) in facilitating knowledge flows within the context of the IoT, demonstrating that knowledge management capabilities enhance system openness and collaborativeness, thereby promoting innovation. Another pivotal study by Wamba et al. (2017) constructs a big data analytics capability model from a resource-based view perspective, and

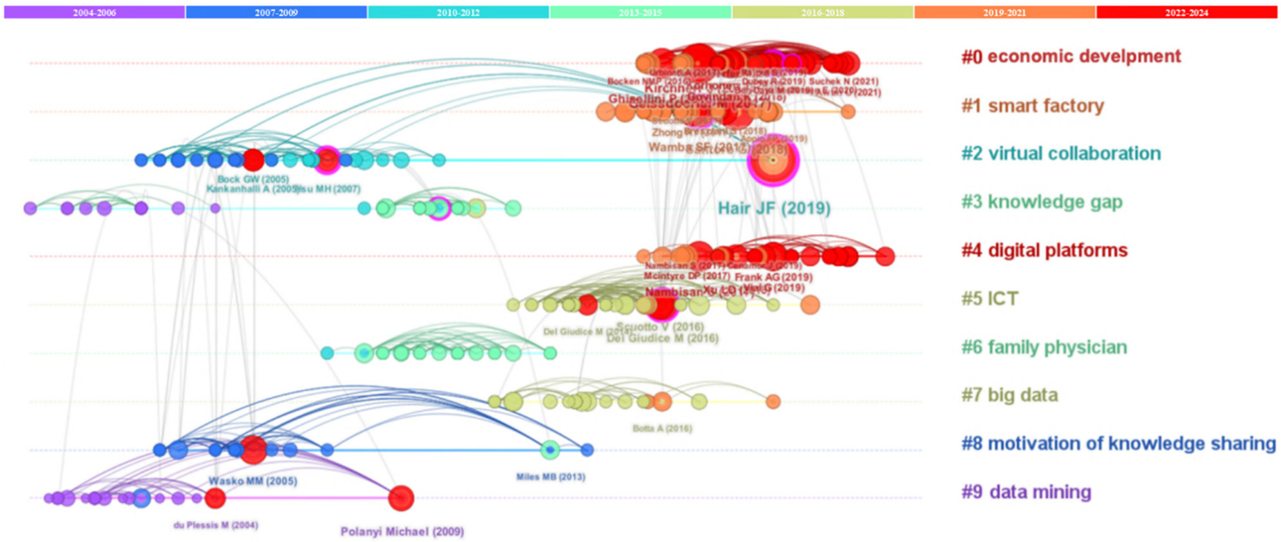

Figure 10: Time series map of co-citation clusters. Source: Exported from CiteSpace.

empirically analyzes the impact mechanism of dynamic knowledge capabilities (PODC) on firm performance (FPER).

4.1.3 Virtual Collaboration Models for Platform Knowledge Management (SCT/PLS)

Virtual collaboration, unlike traditional offline cooperation, requires overcoming a series of discontinuities, including temporal, spatial, organizational, and cultural boundaries (Bieber et al., 2002), as well as challenges related to technological media richness, synchronous/asynchronous communication, and task certainty (Dennis et al., 2008). These aspects have become key entry points for research in this thematic area. The application of social cognitive theory (SCT) to the study of virtual collaboration has emerged as a prominent research paradigm (Hsu et al., 2007). Given that the platform economy is inherently a trust-based economy, scholars have also examined virtual collaboration from an organizational management perspective, focusing on issues such as team leadership and conflict management to ensure the effectiveness of collaboration (Hinds & Mortensen, 2005). The field also draws on interdisciplinary models, including mathematical methods (e.g., comparative probability distributions and fuzzy intervals) and network-based topological metrics. These approaches have contributed to the development of multi-attribute algorithms for optimal team assembly and element evaluation (Kan et al., 2018; Zhang & Fan, 2011). Furthermore, the PLS-SEM method proposed by Hair et al. (2019) in their seminal work "When to Use and How to Report the Results of PLS-SEM" has demonstrated strong applicability in dealing with endogeneity and latent constructs. It has since gained substantial traction in the field of platform knowledge management.

4.1.4 Knowledge Gap Analysis

The concept of the knowledge gap was introduced by Tichenor et al. (1970) to describe the phenomenon whereby the dissemination of mass media information contributes to unequal knowledge acquisition across social groups, thereby reinforcing informational disparities. In the studies within this research cluster, the basic granule of digital knowledge was first defined from a human-centric perspective, introducing the concept of "meta-knowledge," which articulates both "who knows what" and "who knows whom" (Hwang & Jeong, 2009). Building upon this, subsequent classifications such as integrated knowledge and differentiated knowledge, as well as explicit knowledge and tacit knowledge, and distinctions between internal and external organizational knowledge were developed (Ghisellini et al., 2016). Digital knowledge activities are characterized by cross-organizational and cross-temporal interactions, as well as by networked and integrated structures (Carnabuci & Bruggeman, 2009; Waisberg & Nelson, 2018). Based on this conceptualization, scholars have explored various causes of the knowledge gap. Some have identified factors such as educational attainment, media exposure, and standards of knowledge measurement, and have conducted empirical comparisons across different topics to assess the degree of knowledge gaps (Grabe et al., 2009). Other scholars have explored the paradox between internet openness and knowledge-sharing inertia in virtual teams. Drawing on theories of social capital and individual motivation, they have empirically shown that reputation, interaction, and trust enhance the quality instead of the quantity of knowledge gap reduction, forming a foundation for future research (Chang & Chuang, 2011). Building on these insights, later studies have delved deeper into the personalized operational characteristics of virtual teams, including collaboration modes, collaboration environments, incentive design, and task features, thus developing new research entry points such as "platform ecosystems," "volunteer willingness" and "knowledge reuse" (Horwitz & Santillan, 2012; Nylund & Brem, 2023; Rosychuk et al., 2008; Tafvelin et al., 2017). Accordingly, these explorations have not only advanced the evolution of knowledge management models but have also laid an important technical and methodological foundation for the integration of physical technologies with economic development.

4.1.5 Digital Platforms as Carriers of Platform Knowledge Management

Digital platforms have emerged as new carriers for knowledge management, encompassing a wide range of research objects. These range from early forms such as open online communities, social networks, and Wikipedia, to more specialized small-scale platforms after 2020, including platforms for Free/Libre and Open-Source Software (FLOSS) development and profit-oriented public organization platforms. Research entry points are primarily aligned with the demands of Industry 4.0 and the development of entrepreneurial SMEs, leading to the proposal of new knowledge management models, such as those based on service-oriented architecture, business processes, and industrial information, on top of traditional knowledge exchange and technological innovation collaboration platforms (Frank et al., 2019; Xu et al., 2018). These models distinguish themselves from conventional knowledge management by introducing mechanisms like knowledge internalization, knowledge reuse, and stepwise incremental knowledge collaboration organizations. Scholars have analyzed the various new attributes that DT has conferred upon knowledge products, including programmability, searchability, storability, communicability, traceability, sensitivity, and relationality. Other studies have explored the integration of digital technologies and computational techniques with traditional physical components to build new networks and offer expanded knowledge spaces and intelligent functionalities (e.g., cloud computing, big data) (Cenamor et al., 2019).

Several highly cited publications in this thematic cluster are authored by Nambisan and colleagues, highlighting how the boundaries, participants, and underlying assumptions of digital knowledge management fundamentally challenge traditional innovation theories and call for new theoretical perspectives (Nambisan et al., 2017; Nambisan, 2017). Vial (2021) proposed a transformative research pathway linking digital technologies, organizational strategy, and value creation, and emphasized the importance of incorporating an ethical perspective into studies on digital dynamic capabilities. This thematic cluster also introduces new organizational logics for digital knowledge management and fresh approaches to digital business models. Since 2021, research hotspots have particularly focused on intelligent digital innovation.

4.1.6 Information and Communication Technology in Platform Knowledge Management

A large number of research outputs within this cluster were concentrated between 2016 and 2018, with a core focus on leveraging communication and information technologies to enable programmability, addressability, communicability, memorability, traceability, and associability of knowledge activities on virtual platforms (Bouncken et al., 2023). The studies explored how communication information technologies can be applied to facilitate complex inter-organizational knowledge exchanges, especially under scenarios characterized by large-scale, real-time, and multi-modal knowledge activities, and how to effectively select and integrate appropriate information technologies or technology bundles (Schilling et al., 2007).

This thematic area also assessed the critical role of information technology as a core driver for knowledge management innovation. A highly cited explosive paper by Del Giudice and Della Peruta (2016) empirically validated that embedding an IT-based learning application significantly enhances business process performance in enterprises. Scuotto et al. (2016), using IBM's Smart City initiative as a case study, empirically demonstrated that IoT technologies and open innovation models positively influence corporate innovation capabilities in smart cities. This stream of research integrates diverse forces such as knowledge activities, learning institutions, and web-based applications, highlighting the tremendous potential of using new ICTs, including mobile devices, semantic webs, cloud computing, and IoT, to combine knowledge collaboration, learning systems, and digital applications, thereby ushering in new opportunities for intelligent knowledge management.

In the realm of management applications related to this topic, it has been observed that enterprise KMS face integration challenges with existing systems, such as office automation systems and CRM systems. These challenges include data exchange and sharing obstacles due to technical incompatibilities, leading to information silos. Additionally, misalignment in business processes and difficulties in handling unstructured data pose significant issues (Shahrzadi et al., 2024). Within KMS, problems like information overload and noise hinder deep knowledge mining. Furthermore, organizational culture and incentive mechanisms also impact the effectiveness of knowledge management (Lam et al., 2021).

4.1.7 Application of Platform Knowledge Management in Family Medicine

This type of research falls under multidisciplinary studies and represents a form of knowledge innovation and application. Eysenbach (2008) proposed that research on family physicians should enhance several key factors "among user groups to individual users," including the improvement of social networks, increased user engagement, non-mediated information matching, and the promotion of openness and collaboration in online communication. Studies in Internet Medicine and Medicine 2.0 are representative fields that explore online platform-based personal health information management under the backdrop of Web 2.0 technologies. These areas highlight a significant focus of interdisciplinary research and application. The research consistently revolves around the core question: "How do social networks and Web 2.0 technologies transform health, healthcare, medicine, and biomedical research?". Notably, the most highly cited literature within this thematic cluster was published between 2010 and 2018. Such research has not only advanced the informatization and personalization of healthcare services but has also, to some extent, promoted the deep integration of the healthcare industry with economic activities, reflecting the emergence of the health economy centered on biotechnology.

4.1.8 Big Data and Platform Knowledge Management Technology

There are three major research hotspots in this cluster: First, knowledge and knowledge structure identification in the context of big data. Humans are participants in knowledge activities, and the foundation of knowledge activities lies in the description of participants' knowledge. Scholars have defined concepts such as metaknowledge, domain knowledge, and integrated/differentiated knowledge (Barley et al., 2018; Leonardi, 2015; Zahra et al., 2020). Metaknowledge enables the identification and network description of individuals' knowledge states, particularly when combined with big data-based recognition and prediction technologies, which profoundly reflect the level of individuals' or organizations' knowledge accessibility (Naveen & Diwan, 2023). Second, knowledge learning methods under big data, namely "shadow learning." Unlike traditional offline human-to-human knowledge transmission, platform-based knowledge learning involves human-to-machine interactions. Shadow learning offers a mode where individuals adapt to and tolerate the limitations of knowledge bases to a certain extent. Consequently, research on knowledge selection and multi-modal learning approaches has emerged as important topics. This research theme is increasingly integrating with intelligent algorithms and large model studies, leading to the emergence of keywords such as "Internet of Things" and "interoperability." This cluster represents a major distinctive feature of digital knowledge management compared to traditional offline knowledge management, particularly regarding the management technologies that support knowledge reuse during the knowledge transfer process. Third, the integration and analysis of massive datasets based on big data technologies to discover new knowledge pathways and optimize learning processes. A highly cited paper by Botta et al. (2016) proposed the direction of adopting the Cloud IoT paradigm for knowledge management on open-source platforms.

4.1.9 Knowledge Sharing Motivations in Platform Knowledge Management

The "free-rider" phenomenon is an important research issue reflecting market mechanism failure. On internet-based platforms like virtual communities and academic forums, knowledge contributors often do not receive immediate returns for their efforts, whereas "free-riders" may still derive benefits from shared content. Such behavior is often analyzed through the lens of individual motivations for knowledge sharing. A highly co-cited paper by Wasko and Faraj (2005) analyzed the operating mechanism of "personal motivation – social capital – knowledge contribution in electronic networks" using collective action theory. This cluster contains a series of similar empirical studies, introducing research keywords such as "secrecy" and "contingency factors." A seminal and widely cited contribution to this thematic area is Miles's and Huberman "Qualitative Data Analysis: An Expanded Sourcebook"

(1994). Miles provided a qualitative research corpus and hundreds of new techniques, emphasizing that after achieving a tight coupling between information data, storage media, devices, and communication formats, qualitative mining methods can more objectively and scientifically explain related paradoxes. Building on this methodological foundation, a large number of scholars have explored platform knowledge-sharing motivations, making it a crucial methodological approach for this research theme.

4.1.10 Data Mining Methods in Platform Knowledge Management

Knowledge management on digital platforms is based on data as the fundamental resource, placing a strong emphasis on data mining technologies and concepts. In "The Tacit Dimension" (1966), a work widely cited from the late 1960s through 2009, Polanyi proposed that tacit knowledge resides within the processes of learning and transfer, and that its implicit values and judgments can significantly shape scientific discovery. Before this, the prevailing consensus in knowledge management was that the core of scientific discovery was skepticism rather than predetermined beliefs. This new understanding triggered a surge of research on tacit knowledge data mining between 2000 and 2005, with related studies accounting for approximately 30% of the total literature in this cluster, marking it as a significant research hotspot. Another major research focus is data mining of customer knowledge. du Plessis and Boon (2004) first pointed out that customer-centric e-commerce operations, unlike traditional offline business models, require significant enhancements in the dimensions, scope, and depth of customer knowledge management. Specifically, within the data mining cluster, approximately 43% of the studies focus on intelligentization, relying on various intelligent algorithms. Such advances have substantially enhanced data mining capabilities, reflecting the continuous deepening of digital technologies and laying a solid technical foundation for the development of the digital economy.

4.2 Evaluation of Platform Knowledge Management Research

Based on 1,787 sample documents, this study identified ten research clusters. The clustering results, combined with the time-series analysis, reflect the gradual development logic proposed in Perez's "technology – economy co-evolution paradigm," namely, element reconstruction, new carriers, and new applications. This pattern is consistent with the development trajectories observed in various scientific domains (Eum & Lee, 2022; Jovanovic et al., 2022; Yang et al., 2024). As shown in Table 8, the three research categories can be organized into a phased development process. The following sections provide a performance evaluation of each category and identify potential research gaps and future directions.

4.2.1 Research on the Value Reconstruction of Elements in Digital Knowledge Management

Platform knowledge activities generally follow four sequential stages: knowledge identification, sharing, storage, and innovation (Gupta et al., 2000). Six research

Table 8: Research logic, focus, and themes of platform knowledge management

Research groups	Research focus	Themes and starting years
Knowledge element reconstruction	Knowledge identification: Defining and identifying digital knowledge granules, such as meta-knowledge	#3 Knowledge gap (2004-) #9 Data mining (2005-)
	Knowledge sharing: Knowledge-sharing teams/technologies, mechanisms of sharing, human-machine collaboration	#2 Virtual collaborations (2008-) #8 Motivation of knowledge sharing (2007-)
	Knowledge storage: Knowledge storage, retrieval, and flow supported by digital/information/intelligent technologies	#5 ICT (2016-) #7 Big data (2017-)
	Knowledge innovation: Knowledge and product innovation, innovations in process, organization, and business models	
New carriers	DT of traditional knowledge platforms	#4 Digital platforms (2019-)
New applications	New Scenarios: Real-time, large-scale, multimodal, high-quality applications	#6 Family physician (2010-) #1 Smart factory (2019-)
	New Models: Sharing economy, circular economy, ecological economy	#0 Economic development (2020-)

clusters (#3, #9, #2, #8, #5, #7) address these stages, with most focusing on how digital technologies reshape the value of knowledge elements. Key contributions include: the construction of "meta-knowledge" as the smallest unit in digital knowledge management, which extends to concepts such as domain knowledge and integrated knowledge, becoming the basic unit in platform knowledge activities; the proposal that, within massive network data, using related information technologies and network modeling, it is possible to identify and describe the knowledge states, structures, interactions, and transfers of knowledge subjects (individuals, organizations, teams, etc.), and to measure and uncover the factors influencing knowledge gaps and knowledge divides; the introduction of various knowledge network modeling methods based on static and dynamic descriptions of digital knowledge, as well as algorithms for knowledge sharing team formation, simulation evaluation, and their topological structure characteristics; an explanation of the "free rider" market failure phenomenon in knowledge sharing, establishing a research paradigm based on SCT theory, and forming various research methods, such as PLS; and a focus on human-machine interaction "shadow learning" and its algorithms for digital learning.

While the first three stages have evolved in sequence, research on the fourth stage of knowledge innovation remains underdeveloped, with existing work limited to small-scale FLOSS platforms lacking broader representativeness (Jullien et al., 2025). Digital technology acts as an engine for digital knowledge, dividing it into granular forms (e.g., meta-knowledge, integrated knowledge) that drive transformation and create new economic value. However, most current studies adopt a technical perspective, with limited integration into management research and few empirical studies on value reconstruction.

4.2.2 Research on New Carriers for Digital Knowledge Management

The integration of digital technologies into traditional knowledge activity platforms has driven their DT, resulting in new types of digital platform knowledge management carriers. Cluster #4 corresponds to this area of research.

Since 2019, research on digital platforms has grown rapidly, emphasizing integration of digital technologies and physical components (refer to Section 4.1.5 for details). Furthermore, the research has focused on the new attributes of knowledge after DT (Kassab & Darabkh, 2020), such as programmability, memorability, communicability, and associability. These discoveries suggest the potential for deep integration and collaborative development of knowledge management research with multi-disciplinary digital technologies. Third, the research analyzes the connotations and operational mechanisms of platform knowledge management under the new attributes of knowledge, aiming to improve the efficiency of resource allocation, information symmetry, and rational decision-making for knowledge elements.

Digital platforms have rapidly advanced in practice, with many different objects of study, including platforms with digital platform characteristics, such as the IoT, open online communities/social networks, and knowledge-driven public platforms (e.g., Google). Empirical studies have demonstrated the feasibility of implementing some knowledge management functions. Moreover, as digital platform knowledge management challenges traditional market failure theories, achieving information symmetry and assumptions of resource scarcity, scholars have proposed the need for new ethical and qualitative research perspectives to advance deeper investigations. Therefore, there is a pressing need for continued empirical research on digital knowledge platforms with different characteristics to expand research areas and enrich management practices.

4.2.3 Research on New Applications of Digital Knowledge Management

The theoretical research on the application of platform knowledge management manifests in two aspects: First, analyzing how the outcomes of digital platform knowledge management can be applied under different economic models. Cluster #0 in existing research provides a theoretical analysis of this, proposing new economic models such as the spatial economy, full-time/gig economy, circular economy, and ecological economy under the platform economy. However, there is no in-depth research on their application. Second, addressing the complex scenario demands when applying these outcomes. The literature suggests that information and intelligent knowledge management must address various scenarios, including real-time scenarios, massive multi-disciplinary knowledge scenarios, networked multi-modal scenarios, and high-quality knowledge information scenarios, among others.

Practical applications of platform knowledge management are currently most prominent in two domains: family physicians and smart factories. The research related to family doctor services focuses on enhancing personal health information management through digital platforms (Section 4.1.7). In manufacturing, the smart factory is a major application area (Section 4.1.2), focusing on IoT-enabled process transformation and supply chain collaboration.

At present, application areas remain limited, and research objects have not expanded to the various new economic models involved in the platform economy, such as gig economy, circular economy, and ecological economy. The research scope is narrow, and there is a lack of multi-domain research outcomes. Over the years, research keywords related to the two typical application scenarios, namely smart factories and family doctor systems, have shown limited thematic diversity, highlighting the need for broader research exploration and in-depth empirical studies.

4.3 Future Research Prospects

Based on a systematic analysis of the ten research clusters and their temporal evolution, this study identifies an increasingly prominent trend toward the integration of digital technology and economic development, which is highly consistent with Perez's "technology-economy" paradigm. Drawing on the aforementioned empirical results and theoretical references, we reasonably conclude that this trend has strong continuity and expansion potential. Building on recent research advances, this paper outlines future research directions with the aim of further expanding the application scope of platform knowledge management.

4.3.1 Research Content

Digital technologies, powered by advances in fields such as cloud computing and artificial intelligence, are continuously reshaping the architecture of knowledge networks on digital platforms. Future research should focus on strengthening the digital foundation of platforms, including infrastructure research on the DT of platforms, the digitalization of knowledge, information, and data assets, and the organization and evolution of platform-based knowledge networks. In addition, common challenges in knowledge activities, such as the clustering and identification of knowledge granules and clusters, the externalization of tacit knowledge, the integration of human–machine collaboration mechanisms, and intelligent approaches to knowledge innovation (Guo et al., 2025; O'Neill et al., 2025), require in-depth investigation using advanced technologies such as artificial intelligence and semantic mining.

4.3.2 Research Approach

Given the highly interdisciplinary nature of platform knowledge management, future research should be supported by diverse disciplinary logics. While most existing studies originate from technological perspectives, the progression of knowledge management research suggests that perspectives from management and organizational sciences can offer valuable theoretical and practical insights. For example, organizational studies emphasize the needs of individuals, objects, and management processes, thereby informing research frameworks related to social interaction, empowerment, and ecological thinking. Management science focuses on the operational mechanisms and service models of technology-driven industries, while strategic and ethical perspectives highlight issues such as platform governance, accountability structures, and data ethics (Alibašić, 2025; Batool et al., 2023; Raftopoulos & Hamari, 2023). Moving forward, research should engage more deeply with emerging practices and contextual variations across different types of platforms, undertaking diverse empirical investigations to uncover context-specific and personalized knowledge management patterns.

4.3.3 Research Methods

It is necessary to build knowledge models that align with the dynamic mechanisms and characteristics of various systems, for instance, considering the competition and cooperation dynamics in virtual collaborations, constructing complex adaptive systems; taking into account the topological characteristics of networks, exploring approaches for optimizing resource allocation; addressing the chaotic and fuzzy characteristics of knowledge information, and developing algorithms based on fuzzy numerical analysis (Camastra et al., 2024; D'Aniello, 2023; Zaqueros-Martinez et al., 2023). In parallel, there is a growing need to penetrate the "black box" of knowledge processes, identify key influencing factors, and extract economic principles that govern knowledge value creation within platform economies.

The new attributes of digital knowledge brought about by digital technologies allow platform knowledge management to overcome the limitations of traditional knowledge subjects and physical knowledge components. With real-time, large-scale, multimodal knowledge elements accessible via internet search, once the scarcity and asymmetry of knowledge elements are overcome, the research scope of platform knowledge management in terms of breadth, width, and depth will expand dramatically. The potential for driving the value-added growth of platform economy knowledge elements is vast.

Moreover, beyond digital technologies, scholars have also recognized the trend of the organic integration of future physical technologies, biological technologies, and economics (Pashkevich et al., 2023; Piontek et al., 2021; Rahman et al., 2020). Correspondingly, knowledge management under the "biotechnology – economy" collaborative paradigm focuses on areas such as biopharmaceuticals, medical applications, plant breeding, and agricultural applications (Chaturvedi et al., 2019; Kurade et al., 2021; Qaim, 2020). In contrast, the research hotspots and focal points under the "physical technology – economy" collaborative paradigm revolve around Extended Energy Big Data, which focuses on energy and integrates technology and platform management across various dimensions, such as economics, society, engineering, ecology, and national security (Hou & Wang, 2023). These different perspectives on technological revolutions provide potential future research avenues for knowledge management under various development paradigms.

5 Conclusion

Driven by the technological revolution, the digital economy is rapidly thriving at an unprecedented pace, and the importance of digital platform knowledge management is becoming increasingly prominent, with a surge of academic achievements emerging. This paper conducted a bibliometric analysis of 1,787 articles on digital knowledge management from the WoS database spanning from 2004 to 2024, using tools such as Citespace, VOS viewer, and R-Bibliometrix. Based on a review of publication trends, journals/institutions, and regional and disciplinary distributions, the paper identified important research topics in digital platform economy knowledge management through keyword co-occurrence, co-citation clustering, and time-series analyses. It also analyzed the research contributions of high-frequency cited journals. Finally, based on the "digital technology – economy" collaborative development paradigm, the paper reviewed new elements, new carriers, and new applications of digital platform knowledge management, highlighting existing research gaps. The research outlook suggests strengthening interdisciplinary integration and building knowledge activity models that align with various system dynamics and characteristics. The bibliometric and review findings scientifically uncover significant research themes in this field, expand the potential applications of review literature, and contribute to advancing the research of digital platform knowledge management.

Our findings offer several practical implications. For researchers, adopting a multidisciplinary perspective, particularly incorporating insights from management studies, can provide valuable guidance as knowledge management research continues to evolve. Future studies may consider developing knowledge models that are aligned with the dynamic mechanisms and structural characteristics of various systems, thereby enabling deeper exploration of relational networks and platform dynamics. From a research investment perspective, platforms that support multimodal knowledge exchange and interdisciplinary collaboration, such as digital health, sustainable energy, and AI-powered education, hold considerable promise. Focusing on domain-specific platform models that integrate vertical knowledge structures and facilitate new forms of value co-creation among users, organizations, and digital infrastructures may lead to impactful outcomes in both theory and practice.

Despite offering a comprehensive review of the literature on digital platform knowledge management, this study draws exclusively on publications indexed in the Web of Science Core Collection, which may lead to the omission of relevant studies available in other databases such as Scopus or Google Scholar. Moreover, citation patterns are subject to a time lag, as recently published papers typically receive fewer citations than older ones. This can result in the underrepresentation of newer studies that may eventually become highly cited or give rise to emerging research frontiers. As with all bibliometric approaches, the interpretation of research outputs is also subject to methodological limitations. For instance, patterns identified through co-citation or clustering may sometimes reflect data mimicry rather than substantive theoretical connections. Future research could expand on this work by integrating multiple data sources and combining bibliometric techniques with qualitative approaches or expert evaluation to generate more nuanced insights.

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Conflict of interest: Authors state no conflict of interest.

Data availability statement: The datasets used and analyzed during the current study are available from the corresponding author on reasonable request. All data used to generate the figures in this study were obtained from the research conducted by all authors. Accordingly, all figures are original and were generated solely by the authors, and multiple software tools were used for bibliometric analysis and visualization, including CiteSpace (V.6.2.R4), VOSviewer, and R-Bibliometrix.

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