“Trends of artificial intelligence-driven enterprise management development: A bibliometric analysis”

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TRENDS OF ARTIFICIAL INTELLIGENCE-DRIVEN ENTERPRISE MANAGEMENT DEVELOPMENT: A BIBLIOMETRIC ANALYSIS

Abstract

Artificial intelligence (AI) has become the most eye-catching new technology in recent years, and its application is driving the transformation of enterprise management. In order to cope with the impact of new technological changes and address key issues affecting enterprise management development, it is necessary to research and clarify the basic relationship between the application of AI and the development of enterprise management. This study aims to analyze the current situation and future development direction of AI-driven enterprise management through bibliometric analysis. Scopus and Web of Science data from 2014 to July 2025 were analyzed to explore the evolutionary time, geography, and scientific landscape of this topic. The findings contribute to understanding AI's driving role in enterprise management development. The analysis reveals exponential growth in research output on AI-driven management, accompanied by a decreasing growth rate of publications on AI-driven enterprise management since 2021. The important factors that affect research output are population and total GDP. China, the United States, and India were identified as the leading contributors, with significant research activity in this field. Keyword analysis indicates that the thematic focus is becoming more technical and universal. Thematic analysis highlights that human resource management, financial management, supply chain management, and operational decision-making are the main aspects of AI-driven enterprise management, accounting for 94% of the total number of publications. The study proposes a new direction for the development of AI-driven enterprise management, including department integration, cognitive convergence, and ethical and social responsibility.

Keywords enterprise management, digital technologies, human resource management, supply chain management, financial management, operational decisions

JEL Classification M10, M15, O31

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INTRODUCTION

Artificial intelligence (AI), as a general intelligence technology, is gradually promoting changes in enterprise management models. In recent years, academia and business circles have conducted extensive research on the application of AI in management. Consequently, the issue of AI development has also been raised at the state policy level.

As early as July 20, 2017, China's State Council released the Plan for the Development of the New Generation of AI (State Council Document No. 35 dated July 8, 2017). The Plan points out that the theory, technology, and application of AI will reach the world's leading level by 2030, and requires promoting the innovation and application of artificial intelligence technology. The policy will accelerate the development and breakthrough of AI technology.

In October 2023, the U.S. government issued the Administrative Order on the Development and Use of AI Safely, Reliable, and Credibly (Executive Order No. 14110 dated October 30, 2023). The Order mainly pointed out that AI should ensure the safety, stability, and reliability of technology, and promote its responsible development and application.

The European Union formally proposed the draft AI Act in April 2021, and it was officially passed in 2024 (Regulation (EU) of the European Parliament and of the Council No. 2024/1689 dated June 13, 2024). The bill is the world's first comprehensive piece of AI legislation and aims to establish a globally leading AI governance framework, ensuring security, transparency, and controllability of AI, while promoting innovation and economic development.

According to Kazakhstan's Concept of AI Development for 2024–2029 (Government Decree No. 592, dated July 24, 2024), key areas include high-quality data, modern infrastructure, human capital, research and development, legal regulation, and the implementation of acceleration programs. It should be noted that one of the activities of the Concept is designated as "conducting scientific research in the field of AI within the framework of grant and program-targeted financing."

Taken together, these national policy initiatives and enterprise-level needs demonstrate that the innovation and transformation through the application of AI technology is the core engine for enterprises to improve management quality and increase management efficiency. AI is also the key driving force to realize the major strategic needs of enterprises and promote the intelligent layout of enterprises. Consequently, enterprise management innovation and the intelligent integration, transformation, and upgrading are crucial. Although there has been research on AI-driven enterprise management, the existing studies have mainly focused on a single perspective or dimension. There is a lack of systematic sorting and summary of enterprise management driven by AI technology.

1. LITERATURE REVIEW

AI technology is a complex mathematical model that utilizes computer systems and big data analysis techniques. AI technology can be divided into two aspects: logical AI technology and learning AI technology, with the most significant application effects being its logical computing capacity and active learning ability (Li et al., 2024; Seo et al., 2024). These technologies can be used to optimize enterprise management and forecasting and improve the intelligence level of enterprise decision-making (Li & Yao, 2021). The application of learning AI technology has been more significant in promoting and assisting enterprise innovation (Han & Mao, 2023; Redín et al., 2023; Red'ko et al., 2023), including green technology innovation, green management innovation, and green product innovation in enterprises (Chen & Jin, 2023). The application of AI technology is becoming an increasingly important means to improve energy efficiency (Marinakis et al., 2021), maintain grid stability, and develop AI-driven energy management systems (Belgibayeva et al., 2025). AI can also optimize enterprise resource allocation and improve the accuracy of production planning (Rakholia et al., 2024). Based on the above analysis, AI technology can promote the development of enterprise management toward higher levels.

AI-driven management systems can enhance enterprises' adaptability and competitive advantages in response to the external environment, thereby deepening their management (Xu et al., 2021; Liu & Li, 2022; Zhu et al., 2024; Wan & Zhao, 2024). AI has a regulatory effect on enterprise management (Li et al., 2023), and its auxiliary systems can effectively reduce training costs (Foresti et al., 2020). AI drives the core of enterprise economics and forms a competitive advantage through new knowledge innovation (Satpayeva, 2017; Kireyeva et al., 2022). AI helps businesses identify and retrieve external information and predict unexpected events (Jarrahi et al., 2023; Roblek et al., 2024). AI has begun to be applied in human resource management, financial management, supply chain management, and operational decision-making in enterprises (Alekseeva et al., 2021; Guo

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& Polak, 2024; Georgiev et al., 2024; Olan et al., 2024; Garouani et al., 2022; Samuel et al., 2022). It should be noted that while AI brings efficiency improvements, it may also weaken work quality (Charlwood & Guenole, 2022).

AI is about dealing with problems related to soft power, including language, text, algorithms, and video (Brem et al., 2023). At the same time, AI is more about dealing with digital-related issues and cannot replace human creative thinking (Brem et al., 2023; Redín et al., 2023). Another issue is that AI's moral decision-making capabilities are contested: people with different cultural backgrounds and values have different views on the moral decisions of AI (Robinson, 2024). The main risks of AI include transparency issues, liability attribution, privacy violations, algorithmic bias, and unintended consequences. Human emotions are not entirely logical, and causal relationships cannot be directly inferred based on logic. Therefore, AI cannot provide an accurate reference point in dealing with management problems involving human emotion and ethics (Jedličková, 2024). Haefner et al. (2021), drawing on a systematic literature review and theoretical mapping analysis, argued that AI requires human-machine collaboration in creativity and judgment. These findings collectively underscore the need for oversight mechanisms when applying AI in business management contexts (Chubb et al., 2022).

The emergence of AI technology provides research opportunities for innovation management and creates new research directions (Mariani & Dwivedi, 2024). Current studies on AI in management primarily focus on seven areas: data-based enterprise models, organizational change, marketing, collaboration, operations, ecology, and innovation (Huang et al., 2021). Future research is expected to prioritize themes such as inclusive innovation and responsible governance (Dwivedi et al., 2021). In recent years, many bibliometric studies and systematic literature reviews have appeared on the application of artificial intelligence in management. Findings of systematic literature reviews and bibliographic coupling analysis show that AI applications can promote social governance through recommendation systems and sentiment analysis, with sentiment computing, interpretable algorithms, and brand relationship management being particularly prominent in the field of marketing AI (Bawack et al., 2022; Hermann, 2022; Mariani et al., 2022).

Pereira et al. (2023), through a systematic literature review, suggested that managers need to balance employee well-being when adopting AI. Bankins et al. (2024), in a systematic empirical review, demonstrated the double-edged effect of AI and employees, both complementing and substituting each other. Ibadildin et al. (2025) analyzed the application of AI in project management based on bibliometrics. Ayinaddis (2025), combining bibliometrics with VOSviewer visualization, proposed differentiated AI application strategies for enterprises of different sizes. From a methodological perspective, most review articles focus on systematic reviews and theoretical analysis, while a small number focus on empirical analysis. This type of research reveals the complex, intertwined landscape of AI, organizational capabilities, innovation capacity, application scenarios, and sustainability issues. Methodologically, tools such as the PRISMA process, VOSviewer visualization, and the Task Technology Explanation Framework are widely adopted, highlighting the fusion of data-driven and qualitative insights.

Importantly, research on AI-driven enterprise management is not confined to individual business functions. It now encompasses supply chains, business models, and even governance, demonstrating the penetration of AI across all aspects of the enterprise value chain. However, most studies remain focused on addressing a single technical issue, lacking comprehensive analysis and data support across multiple levels, sectors, and development directions. Therefore, a bibliometric study of AI-driven management as a whole, and of AI-driven enterprise management in particular, is essential for mapping research directions, identifying thematic clusters, and reducing fragmentation. Such an approach enables the identification of dominant research themes and provides valuable guidance for both scholars and corporate managers.

So, this study aims to analyze the current situation and future development direction of AI-driven enterprise management through bibliometric analysis.

2. METHOD

The analysis was conducted within the methodological framework of bibliometric analysis. Two major databases were selected for data collection: Scopus and Web of Science. The sample was limited to peer-reviewed journal articles, covering the period from 2014 to July 2025. Zotero software was used to clean the obtained article data, VOSviewer 1.6.20 was employed for visualization analysis, and Microsoft Excel was applied for manual organization and classification analysis.

The bibliometric analysis was implemented in four stages (Figure 1). In the first stage of research, the database and keywords were determined, and the language of the publications was not limited. In the second stage of the research, two types of article information were screened, mainly management and enterprise management, to comprehen-

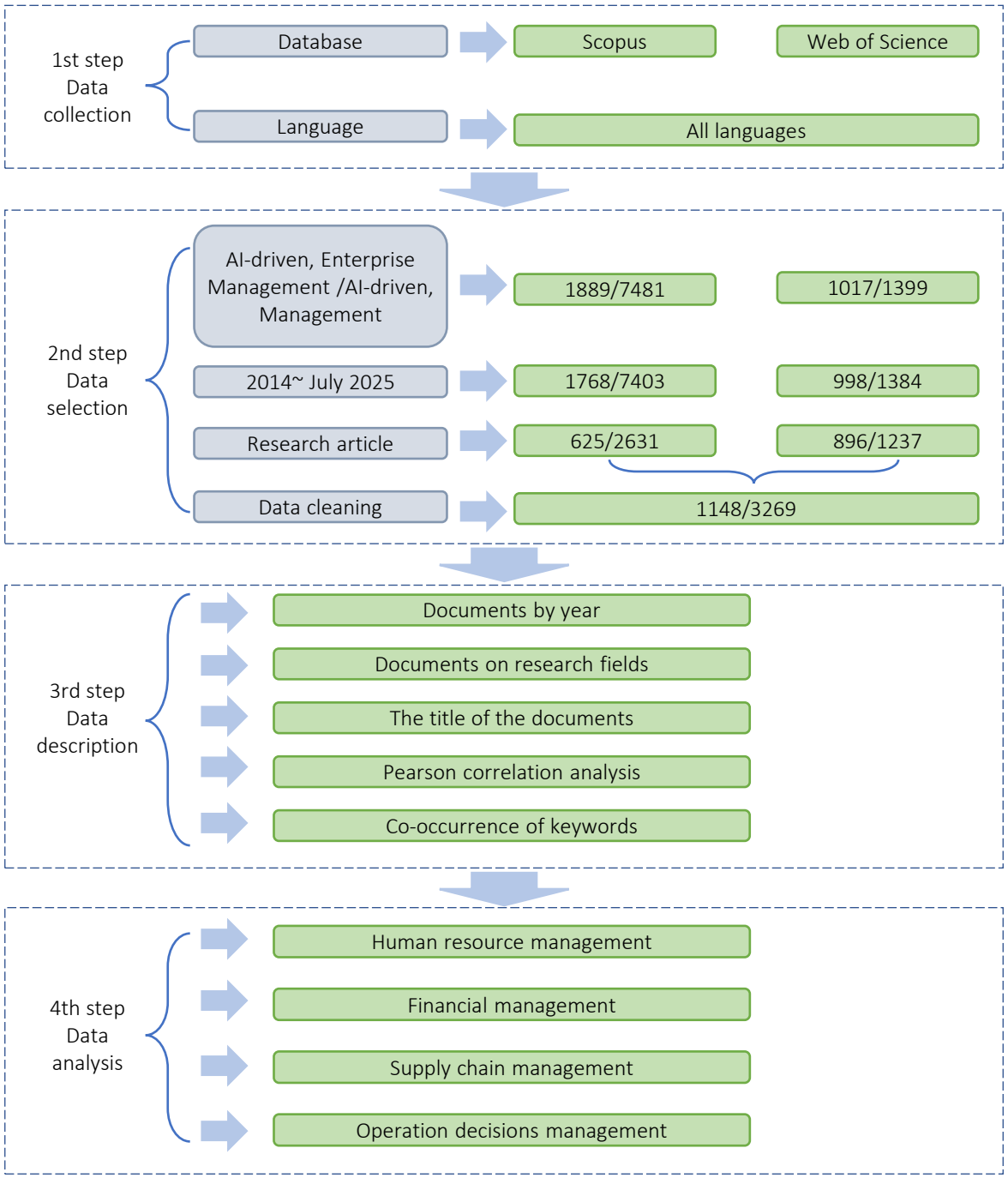

Figure 1. Research framework

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Table 1. AI application keywords

Classification	Keyword
Human resource management	Human resources, Talent, Employees, Recruitment, Training, Human resource management
Financial management	Financial management, Finance, Investment, Accounting, Capital, Risk management
Supply chain management	Supply chain, Logistics, Supply, Warehousing, Distribution
Decision-making management	Decision making, Decision management, Decision, Forecast

sively analyze the importance of AI in enterprise management and its future development trends. Using the keywords "AI-driven" and "management" to screen the literature, 7,481 documents were retrieved from the Scopus database, and 1,399 documents were retrieved from the Web of Science database. Using the keywords "AI-driven" and "enterprise management" to screen the literature, 1,889 documents were retrieved from the Scopus database, and 1,017 documents were retrieved from the Web of Science database. After in-depth screening and cleaning of the article data, 3,269 and 1,148 articles were retained, respectively. In the third stage, the collected documents were visualized and analyzed. Articles were classified by year, title, scientific field, country, and keyword. In the fourth stage, an in-depth analysis of the literature's practical application areas was conducted.

By analyzing the keyword information in the titles and abstracts of 3,269 articles, relevant publications were identified on human resource management, financial management, supply chain management, and operational decision-making management (Table 1).

Table 2 summarizes the number of articles on human resource management, financial management, supply chain management, and operational decision-making management in AI-driven management.

Based on these keywords, 45 articles were selected from 1,148 articles that answer the following research question (Table 3): What is the impact of AI on the development of enterprise management, including human resource management, enterprise supply chain management, enterprise financial management, and enterprise operational decision-making? The main methods of analysis used were content analysis, synthesis, generalization, and systematization.

Pearson correlation analysis was used to analyze the relationship between the number of publications on AI-driven enterprise management and population size, total gross domestic product (GDP), and GDP per capita. This study employed Python and Matplotlib to perform Pearson correlation analysis and generate the corresponding plots. The equation is as follows:

$$r = \frac{\sum_{i=1}^{n}\left(X_i - \overline{X}\right)\left(Y_i - \overline{Y}\right)}{\sqrt{\sum_{i=1}^{n}\left(X_i - \overline{X}\right)^2}\sqrt{\sum_{i=1}^{n}\left(Y_i - \overline{Y}\right)^2}}, \quad (1)$$

where r is the sample correlation coefficient, n is the sample size, $\overline{X}$ and $\overline{Y}$ are the mean values of X and Y, respectively.

Table 2. Number of articles on AI in the field of management

Year	Decision-making management	Financial management	HR management	Supply chain management
2014	2	1	0	0
2015	1	0	0	0
2016	0	3	1	1
2017	0	0	1	0
2018	1	0	4	1
2019	12	6	2	4
2020	20	4	10	5
2021	26	14	15	17
2022	48	17	28	15
2023	68	23	53	41
2024	235	70	148	77
2025	328	137	215	149

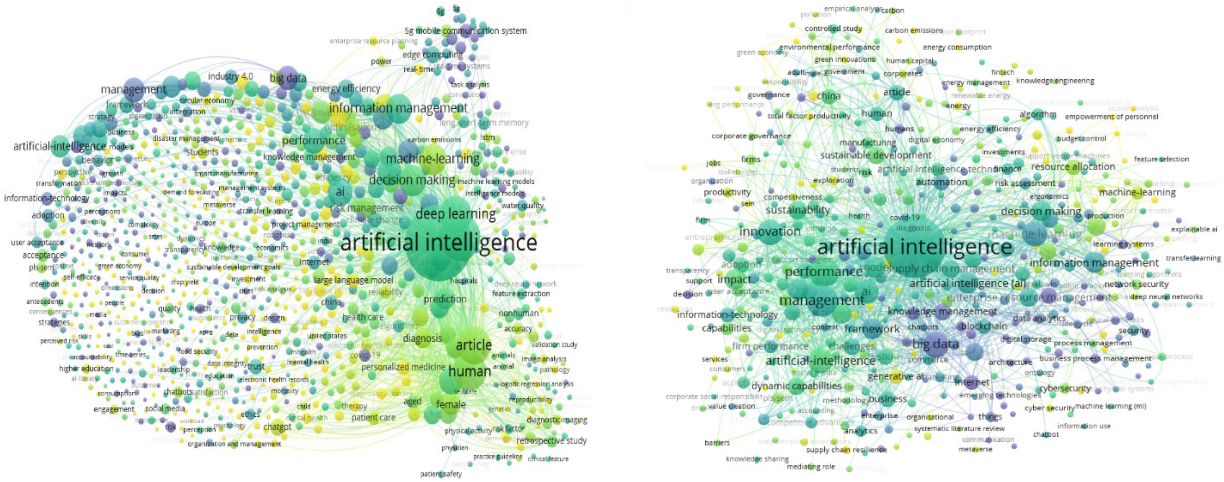
Table 3. Number of articles about AI in the field of enterprise management

Year	Decision-making management	Financial management	HR management	Supply chain management
2014	2	1	0	1
2015	0	0	0	0
2016	2	2	0	0
2017	1	0	0	1
2018	1	2	2	2
2019	8	5	2	4
2020	8	6	7	9
2021	23	15	13	16
2022	30	20	21	13
2023	46	22	39	26
2024	103	74	65	65
2025	113	101	96	73

3. RESULTS

Research on AI-driven enterprise management has garnered widespread attention and has become a prominent topic in the management field. From 2014 to July 2025, there were 3,269 articles related to AI-driven management in the Scopus and Web of Science databases, of which 1,148 (35.12%) were directly connected to enterprise management. Among articles related to data-driven AI for enterprise management, those on human resource management, financial management, supply chain management, and operational decision-making account for as much as 90.68%. Research output in this field has grown rapidly over the past six years, and as of 2025, the number of articles published in this area continues to increase significantly. In the first seven months of 2025, almost as many articles were published as in the entire two-year period from 2023 to 2024.

AI-driven enterprise management articles are mainly concentrated in four areas, but their growth rate is declining. The proportion of articles on AI-driven enterprise management in the total number of articles on AI-driven management has decreased from 58.78% in 2021 to 28.54% in July 2025. The proportion of articles about human resource management, financial management, supply chain management, and operational decision management in the total number of AI-driven management articles increased from 50% in 2014 to 58% in July 2025. In the total number of AI-



a) AI-driven management

b) AI-driven enterprise management

Figure 2. Research hotspot relationship

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Table 4. Cluster description of keyword formation

Color	Period	Keyword	Subject
AI-driven management			
Deep Blue	2015–2018	Management, big data, industry 4.0, information-technology, adoption, user acceptance, models, behavior, digitalization, strategy, framework, growth	Early focus on technology adoption frameworks and digital strategies: exploring whether and how enterprises can accept AI/Big Data and embed it into management processes
Green	2019–2022	AI, machine-learning, deep learning, information management, decision making, performance, prediction, human, article, diagnosis, health care, risk management, internet	Entering the stage of deep integration of technology and business: AI/ML is used for high-value scenarios such as decision support, performance improvement, and medical diagnosis
Yellow	2023–2025	ChatGPT, large language model, edge computing, 5G mobile communication system, energy efficiency, carbon emissions, privacy, ethics, trust, transparency, social media, green economy	Latest frontiers: generative AI (LLM), Edge Intelligence, and the rise of sustainable/ethical issues, focusing on security, privacy, and ESG Performance
AI-driven enterprise management			
Deep Blue / Purple	2014–2018	Information-technology, security, business process management, architecture, chatbot, ontology, things (IoT), framework, adoption, capabilities, metaverse	Early discussions focused on IT fundamentals and process management, exploring BPM, information security, and IoT frameworks
Green	2019–2022	AI, management, performance, decision making, information management, supply chain management, enterprise resource management, innovation, sustainability, blockchain, data analytics	AI integration into core functions: from supply chain and ERP to sustainable innovation and blockchain collaboration
Yellow / Yellow Green	2023–2025	Generative AI, explainable AI, resource allocation, transfer learning, fintech, risk assessment, green economy, environmental performance, jobs, particle swarm optimization	Generative/explainable AI and green performance have become new hotspots; algorithm level focuses on transferability and optimal resource allocation

driven enterprise management, it increased from 33% in 2017 to 94% in July 2025, although during the earlier period (2014–2017), it had dropped from 100% to 33%.

The clustering network of research articles (Figure 2) demonstrates that both AI-driven management and AI-driven enterprise management can be divided into three stages (Table 4).

Through the visual examination of Figure 2 and the verification of keyword overlap, the "four major functional concentrations" in AI-driven enterprise management can be identified. In human resource management, the focus includes chatbots, trust, user acceptance, and ethics. In financial management, the key terms are fintech, risk assessment, and blockchain. In supply chain management, the relevant themes are edge computing and resource allocation. In operational decision management, the concentration is on decision-making, explainable AI, and transfer learning. These functional categories appear in both figures and enter the core network from the periphery over time, confirming their role as the current central domains of AI-driven enterprise management research.

The frequency of phrase occurrence in the top 50 highly cited articles among the selected articles shows that the technology category mainly includes artificial intelligence (24), machine learning (4), and federated learning (3); the management application category includes supply chain (7) and case study (3); the architecture category includes edge computing (4), mobile edge (2), and edge intelligence (3). Topics with this content as the primary focus are more innovative and versatile, and are more easily indexed by journals.

In terms of geographical distribution, China has the highest number of publications on the topic of artificial intelligence, followed by India and the United States. Among the top 50 most cited articles, there are 11 authored by researcher from Chinese institutions (Tianjin University, Huazhong University of Science and Technology, University of Electronic Science and Technology of China, Hong Kong Polytechnic University, Shanghai Jiao Tong University, Chinese Academy of Sciences, Shenzhen Institutes of Advanced Technology, Hubei Polytechnic University, Northwestern Polytechnical University, Zhejiang University). Next, 9 are authored by researchers from U.S. institutions (University of Texas at Austin, Lebanese

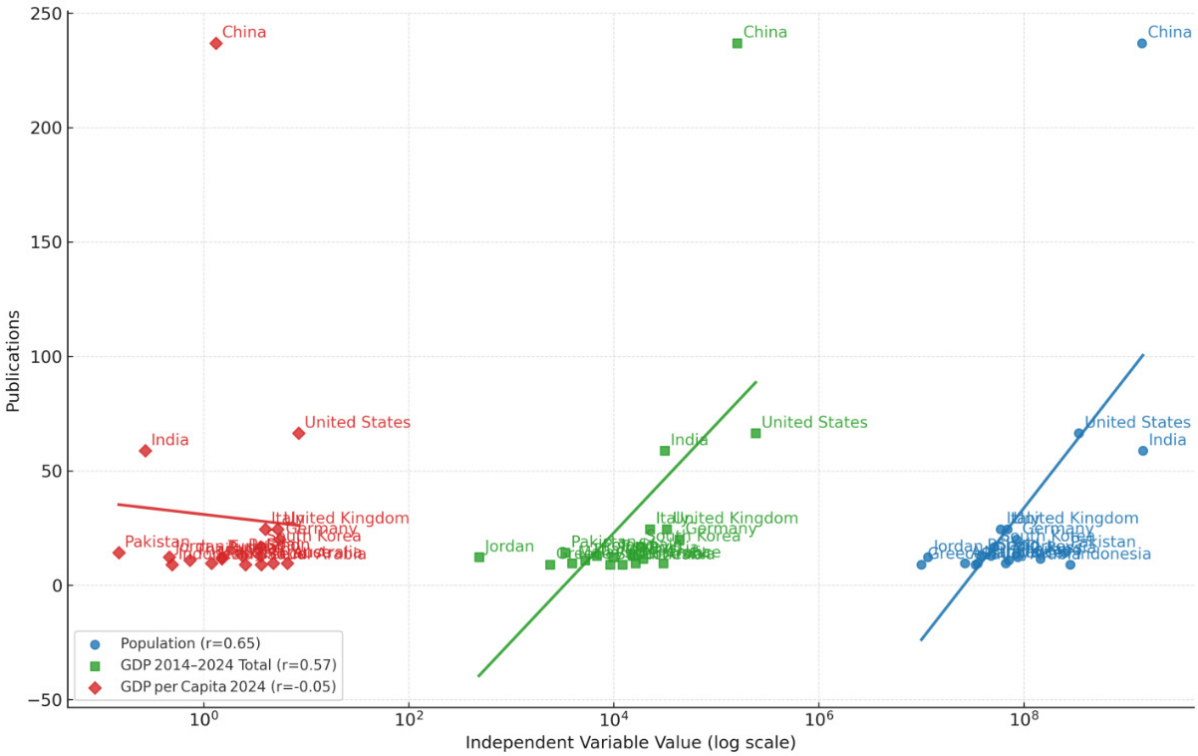

Figure 3. Pearson coefficient correlation map

American University, Georgia State University, New Jersey Institute of Technology, Toyota Motor North America Research and Development, Duke University, Happify Health, Michigan State University, Alcorn State University). The dominance of Chinese and American institutions suggests that China and the United States are leading global research efforts in enterprise management driven by artificial intelligence.

Through data comparison and analysis, it was found that the number of publications is positively correlated with economic scale and total population (Figure 3).

In Figure 3, the blue part represents the relationship between the number of publications and population, and the Pearson correlation coefficient indicates a strong positive correlation between the two, with a clear concentration trend in the point cloud. Countries with larger populations tend to have higher publication volumes. The green part represents the relationship between the number of publications and the total GDP, and the Pearson correlation coefficient shows a moderate correlation between the two. The figure indicates that economic giants (such as China and the United States) are located in the upper right quadrant. However, some economies (high GDP, low publications, and vice versa) also indicate that relying solely on economic scale is not a sufficient condition. The red part represents the relationship between the number of publications and GDP per capita. The Pearson correlation coefficient shows no correlation, the point cloud shows a horizontal band distribution, and the fitted line is almost horizontal, confirming that the correlation between the two is very weak.

To sum up, bibliometric analysis reveals that the number of publications has been increasing year by year since 2020, with rapid growth after 2022. According to statistics from the countries where the first author's country, China, the United States, and India together account for more than 40% of the total sample size in terms of publication volume. Meanwhile, research has found that the number of publications is positively correlated with a country's gross domestic product and population. The driving force of artificial intelligence on enterprise management mainly focuses on human resource management, supply chain management, financial management, and operational decision-making.

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4. DISCUSSION

Academics and policymakers ensure that AI research and applications are directed toward promoting scientific progress when promoting AI applications (Chubb et al., 2022). Moreover, AI research requires the integration of technology with the social sciences to establish an interdisciplinary AI research framework to balance technological innovation with social responsibility (Bailey & Barley, 2020). The findings confirm the results of previous studies, which show that the number of articles related to AI-driven management is growing (Ibadildin et al., 2025). However, this study found that the publication growth rate of AI-driven enterprise management is lower than that of AI-driven management and has been declining since 2021. The visual analysis confirmed that the research on enterprise management driven by AI remains the main research frontier, and the keyword clusters have gradually expanded beyond human resource management, financial management, supply chain management, and operational decision-making management. The results also indicated that the larger the research population, the greater the scale of publications; moreover, economic strength serves as an important determinant of scientific research output. So, these findings imply that large economies with significant populations are more likely to dominate global knowledge production in this field. Therefore, the research achievements of China, the United States, and India in the field of AI-driven enterprise management will continue to lead those of other countries. This confirms the findings of Belgibayeva et al. (2025), which showed that these three countries are leading contributors to related topics, including AI-driven energy management.

According to the literature review, there are four typical paradigms in terms of methodology: bibliometrics, systematic reviews, conceptual models, and multi-level integration, reflecting the trend of cross-method integration in the field of AI-driven management. For example, Bawack et al. (2022) and Mustak et al. (2021) used data-driven technologies such as Bibliometrix and Latent Dirichlet Allocation to achieve "AI research" and improve literature processing efficiency. Mariani et al. (2022) combined bibliographic coupling and qualitative comparison to demonstrate that interdisciplinary theoretical grafting is key to understanding the consequences of AI behavior. Haefner et al. (2021) and Jarrahi et al. (2023) employed conceptual models and behavioral theory mappings to highlight that framework construction can serve as navigation coordinates for research agendas in the absence of sufficient empirical evidence. Multi-level review calls for future empirical work to adopt experimental, on-site tracking, and mixed methods to capture the dynamic interactions of AI at the individual, team, and organizational levels (Pereira et al., 2023; Bankins et al., 2024). Dwivedi et al. (2021) highlight macro-level integration, reminding scholars to pay attention to regulatory, ethical, and policy variables, thereby laying the foundation for the "technology–system–society" trinity research paradigm. From the research findings, most of the literature on artificial intelligence management reviews has not paid attention to the development trends of cross-departmental enterprise management. Meanwhile, analyzing AI-driven management and AI-driven enterprise management through the prism of main business processes (namely, human resource management, financial management, supply chain management, and operational decision-making management) is one of the advantages of this analysis.

However, this paper has some limitations. Firstly, the literature only used Scopus and Web of Science databases and did not search other databases. Additionally, the keyword incorporates the term "AI", while terms such as "digital transformation" and "intelligence" are also commonly used in various contexts. Nevertheless, choosing the keyword "AI" is more suitable for the topic of enterprise management. Secondly, this study only selected articles and excluded books, comments, and conference papers. The scope of research on the application of AI technology in management could be further expanded by incorporating other scientific databases. This analysis primarily compares and analyzes articles based on the number of references, publication regions, keywords, content, and classification, without considering the impact of article quality and influence on the conclusions. Therefore, the universality of the conclusions across different regions remains questionable. Future research could incorporate journal rankings and citation rates into comparative analysis to enhance the robustness of the findings.

CONCLUSION

This study aimed to analyze the current situation and future development direction of AI-driven enterprise management through bibliometric analysis. It reveals the development trend of AI-driven enterprise management, with publication output concentrated in human resource management, financial management, supply chain management, and operational decision-making management. The growth rate of publications on AI-driven enterprise management is much lower than that of publications on AI-driven management. This indicates that AI-driven management is gradually breaking through digital and technological barriers between departments, driving enterprise management toward a collaborative network centered on AI and data. The keywords of highly cited papers are developing toward versatility, highlighting the conclusion that AI-driven management is moving toward higher dimensions beyond individual departments. The main factors promoting the growth of articles are population size and total GDP.

This study also found that, in the context of AI technology application, corporate departments are moving toward greater information transparency, flatter management structures, autonomous operations, and human-machine collaboration. Three new research directions are proposed for AI-driven enterprise management: department integration (AI will break down barriers between departments, promote departmental integration, and further improve management efficiency), cognitive convergence (AI will gradually or infinitely approximate the laws of human thinking, reduce the thinking differences between humans and AI, and minimize conflicts between humans and AI), and ethical and social responsibility (research should explore how to address social and ethical issues between humans and AI in the process of enterprise management, and promote harmonious development).

This study provides new insights into the evolution of AI-driven enterprise management, offering both theoretical contributions and practical guidance. For scholars, it highlights emerging research clusters and methodological gaps; for managers, it provides a reference framework for designing strategies in line with technological and organizational change.

AUTHOR CONTRIBUTIONS

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Writing – original draft: Liangliang Xue, Zaira Satpayeva, Dana Kangalakova, Ercan Özen.
Writing – review & editing: Liangliang Xue, Zaira Satpayeva, Dana Kangalakova, Ercan Özen.

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