Scientometric Analysis of Artificial Intelligence in the Digital Economy

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Abstract. As the digital economy enters a period of deepening applications, artificial intelligence has become an important tool for reshaping the economic structure. Based on the Web of Science core collection database, this paper conducts a systematic scientiometric analysis of 494 papers in the field of artificial intelligence in the digital economy. By constructing keyword co-occurrence networks and clustering maps, this study reveals the evolution context and frontier hotspots of this field. The results show that: (1) The research hotspots focus on "AI-empowered green ESG", "labor market reconstruction", and "data element governance", indicating that AI research is transforming from a simple technical efficiency orientation to a sustainable development and social governance orientation. (2) The time series map shows that the focus of research has shifted from the early "technical architecture construction" (such as cloud computing and Internet of Things) to the in-depth "scenario-based empowerment" (such as generative AI, metaverse, digital finance). (3) "Interactive AI", "algorithm compliance," and "cost optimization and efficiency enhancement" are the most promising research directions at present. This study objectively presents the knowledge structure of AI research in the digital economy, and also provides a scientific basis for understanding the economic externalities of AI technology.

Keywords: artificial intelligence; Internet economy; scientific econometric analysis; Interactive customer service

1 Introduction

Artificial intelligence (AI) is reshaping the structure and model of the global economy [1]. As the core technology of the digital economy, artificial intelligence not only drives industrial transformation and upgrading, driving productivity transformation [2], but also profoundly changes the operation mode and value creation mode of enterprises [3]. In particular, artificial intelligence represented by interactive customer service has played a major role in improving user experience, resource allocation, and releasing growth potential in the Internet economy [4].

From an academic point of view, the intersection of artificial intelligence and the digital economy is transforming. Early research mainly focuses on digital

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infrastructure, such as big data and the Internet of Things, and studies the potential value of cutting-edge technologies in macro society and future business scenarios. With the deepening of research, scholars have discussed the application of macro-level technologies to value creation in micro-enterprises, and systematically verified how digital technology empowers enterprise performance and sustainable development [5]. At present, this field has entered a stage of deepening and explosion: digital research has a high and extensive focus on the core productivity factors of "AI adoption" and "artificial intelligence application" [6], and the research has completely crossed the early conceptual discussion and fully entered the period of in-depth quantitative empirical evidence based on large-sample panel data [7].

In the above research, AI-powered interactive customer service, as a typical scenario of deep integration of artificial intelligence technology and the Internet economy, is increasingly becoming an emerging focus of academic attention [8]. These applications optimize the customer service experience through intelligent interaction systems while reducing labor costs, which in turn directly affects the revenue and profitability of the enterprise. Studies have shown that AI investment can significantly improve enterprise output, especially in manufacturing and high-tech sectors. AI applications can effectively promote the transformation of enterprise productivity by optimizing resource allocation, AI-driven interactive marketing can enhance brand loyalty and retain consumers, virtual digital employees have shown great potential in reducing operating costs [9], and artificial intelligence is also affecting enterprise performance through green value co-creation [10].

It is worth noting that the time series analysis shows that the focus of research in this field is shifting significantly: from the early "maximization of technical efficiency" to "data element governance and algorithm compliance". At the same time, the density distribution of research hotspots shows that the extremely hot areas are highly concentrated in nodes such as "enterprises", "performance", and "empirical evidence", which proves that this field has formed a mature knowledge network oriented by enterprise value creation and supported by rigorous empirical evidence.

However, the above research on interactive customer service artificial intelligence is still relatively scattered, without forming a systematic knowledge framework, and there is a lack of literature to study this subfield. In order to sort out this research field, this paper uses scientometric methods to analyze the academic literature in the field of artificial intelligence under the digital economy based on the Web of Science core collection database. The keyword co-occurrence network and temporal evolution graph are constructed. This study aims to identify the knowledge structure and core clustering in this field, describe the transformation trajectory of research hotspots, focus on the impact mechanism of interactive customer service artificial intelligence on the Internet economy, reveal its role and research progress in cost optimization and efficiency enhancement, and analyze the mechanism of artificial intelligence technology creating value in the digital economy based on the literature.

2 Research Data and Method Description

Definition of the scope of this article. This article is based on the Web of Science (WoS) Core Collection Database, January 11, 2026. The search query was TS= ("Digital Economy") and TS= ("Artificial Intelligence" or "AI"). This database covers major citation indexes such as SCI-Expanded, SSCI, A&HCI, and ESCI, excluding conference proceedings, book chapters, and editorials. The time span is from 1984 to 2026, and a total of 494 articles were retrieved. These literatures cover the interdisciplinary frontier achievements from the underlying architecture of digital technology to the transformation of micro-enterprise environmental performance, and forms the knowledge graph database of this study. Research tools and technical route. For analytical purposes, VOSviewer software is used for visual modeling. In order to overcome the noise interference of plain text data, a rigorous synonym cleaning dictionary (Thesaurus) was constructed in advance, and the keyword co-occurrence network analysis, overlay visualization and node density analysis were performed sequentially by using text mining technology. To ensure the academic science of map clustering and evolution. The total number of citations in this paper is 5640, the average number of citations for each item is 11.42, and the h-index is 35.

3 Knowledge Graph and Evolution Context Analysis Based on Scientific Metrics

3.1 Annual Publication and Citation Trends

Based on text data mining and network analysis, a reasonable word frequency threshold is set (The keyword co-occurrence analysis was conducted using VOSviewer (v1.6.20), applying the full counting method. Parameters included a minimum occurrence threshold of 5 (yielding 56 core nodes), default Association strength normalization, and a clustering resolution of 1.00.) To provide quantitative evidence for the overall evolutionary dynamics and academic interest in this field, an analysis of the annual publications and citations was primarily conducted (Figure 1). As illustrated, the period from 2017 to 2026 exhibits a remarkable upward trajectory in both the number of publications (left axis, bar chart) and citations (right axis, line chart).

Specifically, the research output experienced explosive growth and reached its absolute peak in 2025, with citations simultaneously hitting the highest point. This exponential surge is not merely a natural academic progression but is profoundly driven by external technological breakthroughs and macro-policy stimuli. Theoretically, according to the Diffusion of Innovations theory, the maturation of underlying digital infrastructure has catalyzed the widespread adoption of AI in the digital economy. In practice, the explosive emergence of Generative AI and global regulatory policies concerning data element governance around 2023-2024 have compelled researchers to intensively investigate the economic externalities and sustainable management of AI, thereby driving the academic output to its zenith in 2025.

It is worth noting that the apparent decline in both metrics in 2026 does not indicate a cooling of academic interest but is strictly due to the data retrieval window constraint (data collected in January 2026), which only captures a fragment of the annual record.

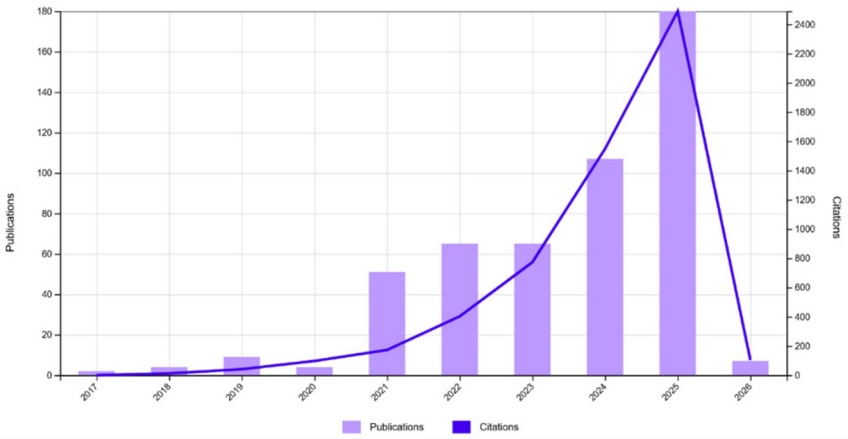

Fig. 1. Annual trends of publications and citations in AI and digital economy research (2017-2026)

Such a dynamic growth pattern necessitates a closer look at the temporal turning points and the macro-level drivers propelling this expansion.

In the context of the Internet economy, the underlying data collection and analysis are highly dependent on digital technology, and the potential risks of data monitoring and digital oligopoly have aroused the alarm of academic circles [11], echoing Zuboff's theory of "Surveillance Capitalism", where digital platforms accumulate capital through data extraction**.** At the same time, the academic community has begun to pay attention to the governance boundaries of "data property rights", "privacy computing", and "algorithm compliance", emphasizing that technological efficiency and ethical compliance must be taken into account while intelligent transformation [12]. "Intelligent Empowerment and Sustainable Value Creation", this cluster occupies the core position of the map, and sustainable development, enterprise performance, technological innovation, and AI are the key nodes. This reveals the core value of artificial intelligence at the enterprise level, directly improving corporate energy efficiency and improving ESG performance through green technology innovation [5,13]. This graph illustrates that current research has fully entered the stage of deep quantification based on big data, such as using natural experiments to accurately evaluate the performance of AI policies on ESG [14]. "Policy Collaboration and Business Decision-Making", which is composed of policy system, business, execution analysis, and solutions, is a bridge between technology and performance. This clustering shows that the integration of AI and EMA can not only implement corporate tactics, but also serve as a basis for policymakers and business executives to conduct strategic research and judgment.

To further understand the maturity of the core knowledge base, this article generates a keyword density view (Figure 2). In this graph, the color heat of the nodes reflects the weight and aggregation density of the topic in the literature network.

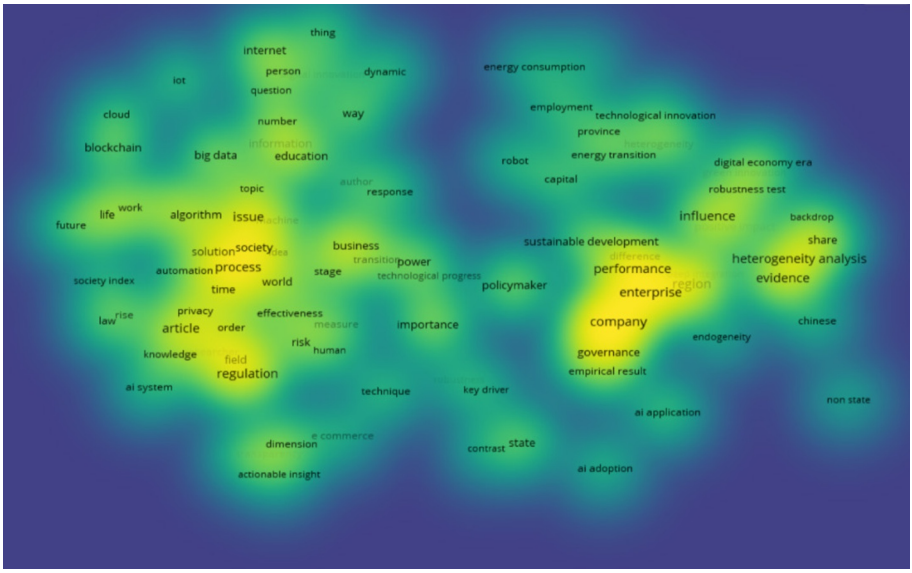

Fig. 2. Hotspot density map of artificial intelligence and corporate sustainability research based on text mining

It can be clearly observed from the density distribution that the research in this intersection has formed a "center-edge" structure. The bright yellow areas with high popularity focus on words such as "enterprise", "performance", and "regulation". This further proves that the integration of the Internet economy and AI technology is not only a marginal conceptual discussion, but also a mature knowledge network oriented by sustainable value creation of enterprises and supported by data in the core area.

3.2 Research Frontiers and Evolution Context: Dynamic Analysis Based on Time Series Superposition

To further reveal the temporal evolution of research hotspots, a temporal overlay map is generated (Figure 3). The transition of node color from cool to warm tones intuitively reflects the shift in the focus of academic research.

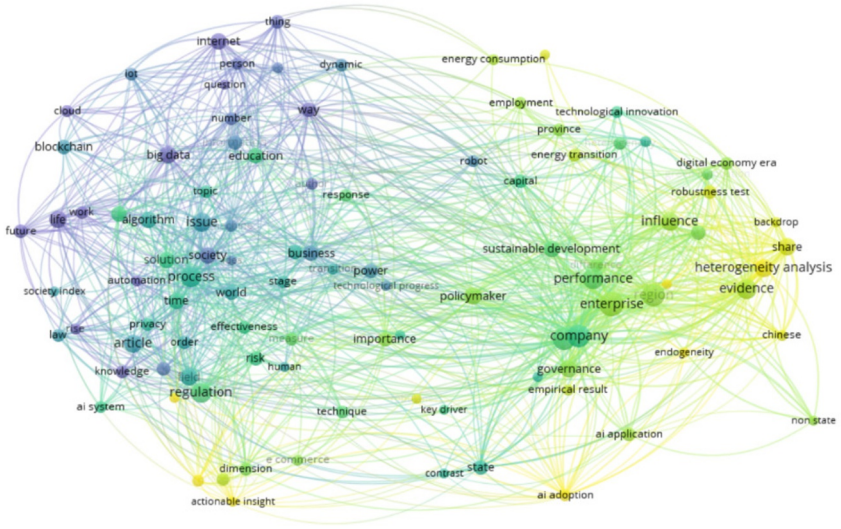

Fig. 3. Evolution trajectory map of artificial intelligence and corporate sustainability research based on time series superposition

Overall, the research in this cross-disciplinary field has gone through three stages:

Early exploration stage: The research is intensively distributed in key points such as big data, Internet of Things, and blockchain, focusing on the construction of underlying digital infrastructure, and only exploring the potential value of cutting-edge technologies in society and future business scenarios [15]. The "infrastructure construction period" in the theory of technology and economics laid the foundation for subsequent application innovations.

Transformation stage: The emergence of sustainable development, corporate performance, and technological innovation, and the research direction has officially shifted from technology hype to the value transformation of enterprises. Scholars have verified that digital technology can empower enterprises to manage the environment, thereby driving the improvement of green innovation capabilities.

Frontier deepening and explosion stage: Digital research focuses on the core productivity factors of "AI adoption" and "AI application". Research shows that the application of AI technology can not only reshape the workforce structure, but also stimulate the demand for a different skilled workforce [16], confirming the Skill-Biased Technological Change hypothesis in labor economics, which posits that new technologies tend to complement high-skilled labor**.** and can also provide digital assistance to companies that are not performing well in ESG to catch up with other companies. At the same time, the emergence of "actionable insights" and "regulation" indicates that research is shifting to how to use AI to extract business value and think about the boundaries of algorithm ethics and compliance associated with AI.

4 Research Conclusions

Through scientific econometric analysis (WoS single database research is only covered), this paper draws the following core conclusions: First, the role of artificial intelligence in enterprises has changed from a single "data processing tool" to the core driving force for reshaping the sustainable development of enterprises, from the Resource-Based View perspective, AI has evolved from an auxiliary resource to a strategic asset for achieving long-term competitive advantage. Second, the frontier hotspots are changing from "maximizing technical benefits" to "data processing and privacy protection". Therefore, we propose that for business managers, not only use AI as a cost-saving tool, but also deeply embed AI technology into environmental management systems, use machine learning to predict environmental risks, and communicate transparent ESG information through interactive AI. At the same time, strict data security and algorithmic defense lines must be established internally. For policymakers: Focus on the critical role of digital empowerment in the green transition. Accelerate digital construction, and formulate laws and regulations for enterprise environmental data sharing and AI algorithm review to provide institutional guarantees for sustainable development in the digital economy.

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