Proceedings of the 5th International Conference on Financial Technology and Business Analysis
DOI: 10.54254/2754-1169/2026.37180

From Chain-Based Global Value Chains to Intelligent Service Ecosystems: New Forms and Governance Challenges in China's Digital Services Trade Driven by Large AI Models

Yuwei Chen

China Agricultural University, Beijing, China
yuwei.chen@ucdenver.edu

Abstract. The large-scale adoption of artificial intelligence (AI) models is changing the logic of value creation in digital services trade. Traditional global value chains are mainly organized around sequential stages such as research and development, production, processing, delivery, and sales. Early software and digitally delivered services reduced the importance of physical transportation, but still relied largely on software products, outsourcing projects, platform functions, and subscription-based delivery. Generative AI, agentic applications, application programming interfaces, and token-based metering are producing a different organizational form. This paper develops the concept of an intelligent service ecosystem to describe a networked system in which models, computing power, data, cloud platforms, developers, enterprises, and users jointly create and continuously deliver intelligent capabilities. The paper argues that the object of trade is shifting from software products to callable capabilities, delivery is shifting from project completion to continuous invocation, and pricing is becoming increasingly granular through tokens and usage. China already has a substantial digital-services and software-industry base for this transition, but important challenges remain in statistical classification, token standards, cross-border data governance, computing infrastructure, service-quality disclosure, and international rule alignment. Policy should therefore move beyond model exports toward ecosystem-level competitiveness and governance.

Keywords: intelligent service ecosystem, global value chains, digital services trade, large AI models, token-based trade

1. Introduction

Digital services trade is increasingly intertwined with artificial intelligence (AI), data, cloud infrastructure, and platform-based delivery. Global value chain (GVC) research has traditionally explained how value-adding activities are distributed across countries and firms. The governance framework developed by Gereffi, Humphrey, and Sturgeon emphasizes transaction complexity, codifiability, and supplier capability as key determinants of inter-firm organization [1]. Baldwin likewise shows how information technology reshaped the international fragmentation of production and reduced coordination costs across borders [2]. These perspectives remain important, but the dominant image of value creation is still largely sequential: research, production, processing, logistics, distribution, and sales are connected through identifiable stages and contractual relationships.

Digital services already differ from manufacturing value chains because service delivery can cross borders without the physical shipment of goods. Research on service globalization and digital services trade shows that network technologies expand the tradability of services, while competitiveness still depends on industrial capacity, market structure, and regulatory institutions [3-5]. Chinese empirical studies further document persistent cross-country differences in digital-services competitiveness, the importance of the digital economy and service structure, and the role of policy and institutional conditions in shaping trade performance [6-12]. These findings indicate that digital services trade cannot be reduced to the idea of an online transaction; it is a form of international value creation jointly shaped by technology, institutions, and market organization.

Large AI models create an additional break with earlier forms of digital trade. Generative AI is no longer used only for text generation, translation, and question answering. It is being embedded in cross-border e-commerce customer service, software development, financial research, marketing, knowledge management, and enterprise process automation. Research on workplace applications finds that generative AI can raise labor productivity, especially for less experienced workers [13], while task-based analyses suggest that large language models can affect a broad range of knowledge-work activities [14]. Korinek further discusses how generative AI can enter research and professional workflows through writing, programming, literature processing, and data analysis [15]. In parallel, research on large-model-driven embodied intelligence shows that large models are moving from content generation toward perception, planning, tool use, and coordinated execution [16].

The commercialization of AI services also introduces a new unit of economic measurement: the token. In this paper, tokens refer to the processing units used to meter large-model input, output, and inference, rather than blockchain or cryptocurrency tokens. Recent Chinese studies link token-based billing to AI business models, value measurement, market design, and cross-border service provision [17-24]. A wider emerging literature also explores the relationship between AI tokens, computing resources, valuation, derivatives, prompts as digital assets, and market dynamics [25-29]. Taken together, these developments suggest that tokens are becoming more than a technical unit; they increasingly connect computing costs, service usage, pricing, settlement, and value allocation.

China provides a relevant setting for examining this transition. According to the Ministry of Commerce, China's total services trade reached renminbi (RMB) 7.5238 trillion in 2024, up 14.4% year on year, while trade in knowledge-intensive services reached RMB 2.89652 trillion, up 6.5% [30]. The China Digital Trade Development Report 2025 reports that trade in digitally deliverable services reached RMB 2.9 trillion in 2024 and that exports of digitally delivered services rose from United States dollars (USD) 79.0 billion in 2014 to USD 220.57 billion in 2024 [31]. These trends indicate that China has an expanding base for high-value, knowledge-intensive, and increasingly intelligent service exports.

The central question is therefore whether a chain-based GVC framework is sufficient when the traded object is no longer a finished software product but a continuously callable intelligent capability; when value is co-created by model providers, computing infrastructure, data, platforms, developers, enterprise users, and feedback loops; and when measurement shifts from contracts and subscriptions toward tokens and invocation volumes. This paper proposes the concept of an intelligent service ecosystem as an analytical extension of GVC thinking for the AI era. The concept emphasizes networked value creation, continuous service delivery, capability-based transactions,

DOI: 10.54254/2754-1169/2026.37180

and token-based measurement. The paper then applies this framework to emerging forms of China's digital services trade and identifies the governance challenges that follow from the transition.

2. Literature review and research gap

2.1. Global value chains and digital services trade

GVC research provides the theoretical starting point for this study. Gereffi et al. show that value-chain governance depends on the complexity of transactions, the extent to which information can be codified, and the capabilities of suppliers [1]. Sturgeon demonstrates that modular production networks can lower coordination costs through standardized interfaces and organizational modularity [32]. These contributions explain how complex production can be decomposed and coordinated across firms and countries. However, their principal empirical reference remains manufacturing and conventional outsourcing, where activities can still be organized as stages along a value chain. The growing importance of cloud platforms, application programming interfaces (APIs), and continuously invoked AI services makes the boundaries between producer, intermediary, developer, and user less stable than in these earlier settings.

Research on digital services trade extends the discussion into networked and digitally delivered services. Jiang and Luo argue that internet technologies created new conditions for cross-border service delivery and accelerated service globalization [3]. Yue and Li show that digital delivery does not automatically eliminate international competitiveness gaps [4], while Meng et al. demonstrate that regulatory heterogeneity and digital-services trade barriers influence cross-border trade in digitally delivered services [5]. Related Chinese research examines digital-services competitiveness, digital-economy development, service-trade structure, and cross-country determinants [6-12]. This literature establishes that technological feasibility is only one component of digital trade; institutions, standards, market access, and domestic capability remain central.

2.2. Generative AI, agents, and productivity

Generative AI research provides the technological basis for understanding the next stage of digital services trade. Brynjolfsson et al. find productivity gains from generative AI in customer-service work [13]. Eloundou et al. identify wide potential exposure of knowledge-work tasks to large language models [14], and Korinek shows how these technologies can reorganize professional and economic-research workflows [15]. These studies focus mainly on productivity and task substitution or complementarity, but their implications for trade are direct: if AI can perform modular knowledge tasks remotely and on demand, a growing share of service inputs can be supplied across borders through digital interfaces.

Research on embodied intelligence and AI agents extends this logic from generation to execution. Bai et al. argue that large models can support perception, task planning, basic policies, reward functions, data generation, and multi-agent coordination [16]. For digital trade, the implication is that AI models are evolving from tools that produce content to infrastructures that can participate in service processes. The traded service may therefore consist of a sequence of model calls, tool invocations, retrieval operations, and automated actions rather than a discrete file, software package, or consulting deliverable.

2.3. Token economics and cross-border AI services

Token-economy research helps explain how these services are metered and monetized. Wang and Zang connect token-based valuation to digital-goods theory, marginal-cost pricing, and network effects, and argue that token billing has become an important commercialization mechanism for large-model firms [19]. Yang and Zhang emphasize that tokens are not perfectly homogeneous commodities because service quality depends on model performance, inference efficiency, and task complexity; they also identify information asymmetry and price-discovery problems in emerging token markets [18]. Ren and Feng focus on the transformation of intelligent capabilities into commodity-like services and the reorganization of value realization around tokenized usage [17].

A related line of research connects tokenization to data governance, computing infrastructure, and internationalization. Huang et al. argue that trusted data spaces can support fine-grained, measurable, and controllable use of data under tokenized service models [21]. Zhou and Yang link token production and circulation to computing power, data, energy, and intelligent labor [20]. Huang and Zhao define the international expansion of token-based AI services as an emerging form of cross-border service supply and value realization, while noting constraints in high-quality supply, international rule compatibility, and value conversion [22]. Xu and Liu discuss a similar progression in digital publishing from content exports toward token circulation and agent deployment [23], and Wu et al. emphasize the need to anchor computing-power pricing in intelligent labor and real value creation [24]. Emerging conceptual studies outside this Chinese literature explore related issues such as token valuation, computing commoditization, derivative design, prompt assets, and market co-movements [25-29].

2.4. Research gap and analytical contribution

The existing literature therefore addresses several pieces of the same transformation, but usually in isolation. GVC studies explain cross-border value organization; digital-trade studies explain digitally delivered services and regulatory barriers; generative-AI studies analyze productivity and task transformation; and token-economy studies examine metering, pricing, and emerging markets. Less attention has been paid to how these elements combine to change the organization of digital services trade itself. The analytical contribution of this paper is to place large AI models, continuous invocation, token-based measurement, platform coordination, computing infrastructure, data governance, and cross-border value creation within a single framework: the intelligent service ecosystem.

3. Intelligent service ecosystems: A new value-chain framework

Table 1. From chain-based value creation to intelligent service ecosystems

Dimension	Chain-based GVCs / conventional digital services	Intelligent service ecosystem
Value architecture	Sequential stages and one-way transfer across identifiable activities	Networked, circular, and feedback-intensive co-creation among multiple actors

DOI: 10.54254/2754-1169/2026.37180

Table 1. (continued)

Object of trade	Products, licenses, outsourcing deliverables, or predefined software functions	Callable capabilities such as generation, reasoning, retrieval, coding, and task execution
Delivery model	Project completion, deployment, contract delivery, or fixed subscription access	Continuous API, cloud, and agent invocation embedded in ongoing workflows
Measurement	Contracts, hours, seats, subscriptions, or project milestones	Tokens, invocation volumes, inference use, and service-level metrics
Core participants	Lead firms, suppliers, outsourcing providers, and distributors	Model providers, compute infrastructure, data providers, cloud platforms, developers, enterprises, and users

An intelligent service ecosystem is defined here as a networked value-creation system centered on large AI models and supported by computing power, data, APIs, cloud platforms, developers, enterprise applications, users, and token-based measurement. Multiple actors jointly participate in the production, delivery, feedback, and continuous improvement of intelligent services. The term ecosystem is not used merely to describe a rapidly growing industry. It refers to a structural change in four dimensions: the actors that create value, the object that is traded, the way the service is delivered, and the mechanism by which usage and value are measured. The comparison in Table 1 highlights these differences.

3.1. From linear division of labor to ecosystem coordination

The first change is the direction of value creation. In a conventional chain, value is typically described as moving through stages such as research, production, processing, logistics, and sales. In an intelligent service ecosystem, value is generated through repeated interaction among models, computing resources, data, platforms, developers, enterprises, and users. User calls and feedback can influence model optimization; enterprise use cases generate new requirements for agents and tools; platform distribution affects invocation scale; and changes in model architecture alter computing costs and application design. Value therefore emerges through feedback loops rather than only through sequential handoffs.

3.2. Production foundations and capability-based transactions

The second change is that apparently intangible AI services rest on a dense production base. Zhou and Yang connect large models with token production, training data, algorithmic labor, computing power, electricity, and communications infrastructure [20]. The cross-border provision of AI services is therefore not detached from physical resources. Every generated response, retrieved document, reasoning step, or automated action depends on chips, data centers, electricity, networks, models, and skilled labor. The service is digitally delivered, but its production is materially grounded.

At the same time, the object of trade shifts from software products toward capabilities. Conventional software trade typically involves licenses, system deployment, maintenance, software-as-a-service functions, or outsourcing deliverables. Large-model services instead sell access to reasoning, language interaction, content generation, coding, knowledge retrieval, decision support,

DOI: 10.54254/2754-1169/2026.37180

or task execution. Huang and Zhao stress that cross-border token-based AI services must be understood as a combination of technical processes, resource transformation, trade attributes, platforms, developers, and application ecosystems rather than as isolated model calls [22].

3.3. Token-based measurement and value realization

The third change concerns measurement and pricing. Traditional services are often priced by project, contract, working hours, licenses, or subscriptions. Large-model services can be metered at a much finer level through input tokens, output tokens, inference-related usage, invocation counts, and service tiers. Wang and Zang argue that token-based billing can more closely connect usage, computing costs, and revenue while also reflecting model architecture, caching, computing configuration, and ecosystem scale [19]. In this sense, tokens function as a value-measurement medium inside the ecosystem, although they are not a universal unit of service quality.

This qualification is important. Equal token quantities can represent very different costs and economic value across models and tasks. Different tokenizers, context windows, reasoning methods, latency, output quality, and task complexity make tokens heterogeneous as service units. Yang and Zhang therefore identify information asymmetry, adverse selection, and incomplete price discovery as important problems in token markets [18]. Tokenization increases measurability but does not eliminate the need for standards, quality disclosure, and service-level comparison.

4. Emerging forms of China's AI-enabled digital services trade

From the intelligent-service-ecosystem perspective, AI-driven digital services trade can be defined as cross-border trade in model-based capabilities delivered through APIs, cloud platforms, or agent systems and measured through tokens, invocation volume, subscriptions, or service levels. The key difference from conventional software trade is not simply that AI is used. It is that the object, delivery mechanism, value organization, and measurement system of the traded service change simultaneously.

4.1. From software products to intelligent capabilities

The first emerging form is the capability-based transaction. A cross-border e-commerce company that calls a large model for multilingual customer service is buying language-interaction capability. A software firm that uses a coding model is buying code-generation and debugging capability. A financial institution that calls a model to summarize research and analyze text is buying knowledge-processing capability. In each case, the service is defined less by ownership of a fixed software product than by access to a task-specific intelligent function. This makes capability, rather than the software package itself, the central trade object.

4.2. From project delivery to continuous invocation

The second form is continuous delivery through invocation. Conventional software projects are often completed through licensing, deployment, implementation, or a clearly bounded contract. AI services operate through repeated cloud and API calls. Each prompt, retrieval operation, generated output, code execution, or automated task can trigger model inference and consume tokens. The service therefore behaves as a continuous flow rather than a one-time deliverable. The commercial value of this model depends on response quality, inference efficiency, reliability, scale, and long-term integration into user workflows. Ren and Feng argue that the value of the token economy lies

DOI: 10.54254/2754-1169/2026.37180

not in invocation volume alone but in the commodification of intelligent capabilities and the reorganization of service production around real application scenarios [17].

4.3. From single-firm supply to ecosystem co-creation

The third form is ecosystem-based value creation. A seemingly simple AI application may depend on a foundation model, cloud platform, computing resources, training data, an enterprise knowledge base, vector databases, plugins, APIs, security filters, and user feedback. The final service is therefore co-produced by multiple actors. Huang et al. describe the interaction of tokens, high-quality datasets, trusted data spaces, and the token economy as an integrated mechanism for the circulation and use of data elements [21]. Extending this logic to international services trade suggests that competitive advantage increasingly depends on how effectively models, data, platforms, developers, standards, and revenue-sharing mechanisms are coordinated.

4.4. From model exports to cross-border tokenized service flows

The fourth form is the cross-border flow of token-metered AI services. Huang and Zhao characterize the internationalization of such services as a new form of cross-border AI service supply and value realization [22]. When an overseas user continuously calls a Chinese model, the economic event is not merely that a model is accessed from abroad. Intelligent capability is supplied across a border, computing resources are consumed in the process, and value is realized through metered usage. This shifts attention from the export of a model as a product toward the recurring export of an intelligent service flow.

This distinction is also useful for international economics. Conventional software trade focuses on licenses, products, or defined functions. AI services trade centers on the orchestration of capabilities and repeated inference. The movement from 'delivering a product' to 'dispatching a capability' makes the ecosystem - rather than the standalone model - a more appropriate unit for analyzing competitiveness, governance, and value capture.

5. China's market foundations and governance challenges

China's recent digital-trade development provides a substantial base for intelligent-service-ecosystem growth, while the rapid expansion of AI usage also exposes new measurement and governance problems. The relevant change is not one single market indicator, but the simultaneous expansion of digitally deliverable services, software and cloud industries, token-based usage, local market experiments, and cross-border AI-service practices.

5.1. Digital services and software industry foundations

China's services trade and digital economy have grown large enough to support AI-enabled service exports. In 2024, total services trade reached RMB 7.5238 trillion, with knowledge-intensive services accounting for RMB 2.89652 trillion [30]. Trade in digitally deliverable services reached RMB 2.9 trillion, while exports of digitally delivered services increased from USD 79.0 billion in 2014 to USD 220.57 billion in 2024 [31]. The software and information-technology services industry also provides an important industrial base: software business revenue reached RMB 13.7276 trillion in 2024, software exports reached USD 56.95 billion, and revenue from cloud computing and big-data services reached RMB 1.4088 trillion [33]. These indicators suggest that the

DOI: 10.54254/2754-1169/2026.37180

transition toward intelligent services is occurring on top of an already large digital-services and software ecosystem.

5.2. Token economy and local experimentation

A second change is the emergence of token-based economic practices. Studies of local experimentation in Hangzhou, Guizhou, Shenzhen, Anhui, and other areas identify differences in subsidies, market access, pricing systems, and platform design, suggesting that token markets are moving from conceptual discussion toward institutional experimentation [18]. The significance of these experiments lies less in creating a single standardized commodity market immediately than in testing how AI service usage can be measured, priced, settled, and governed.

Usage data also indicate rapid growth in demand for AI services. Zhou and Yang report that by March 2026 China's average daily token calls had exceeded 140 trillion, compared with roughly 100 billion in early 2024, and they cite OpenRouter data showing weekly use of Chinese large models above 7 trillion tokens in March 2026 [20]. These figures should not be treated as equivalent to official services-export statistics, because platform invocation data and cross-border trade statistics measure different objects. They nevertheless indicate that Chinese models have reached a scale at which usage-based service supply can become economically meaningful.

5.3. Cross-border expansion and emerging practices

The internationalization of token-metered AI services is becoming more visible. Huang and Zhao argue that such cross-border supply can create new digital-trade advantages but also faces constraints in high-quality service provision, cross-border regulatory compatibility, value conversion, and external competition [22]. They further report that Shantou completed a full-chain closed-loop validation of a 'token going global' transaction in April 2026 [22]. The importance of this case is not its scale alone; it shows an attempt to connect model invocation, metering, settlement, and cross-border service delivery within one operational process.

China also has structural advantages that may support ecosystem competition, including a large domestic market, diverse application scenarios, manufacturing and service-industry demand, expanding cloud infrastructure, and an active open-source community. These assets can accelerate learning through use cases and developer participation. At the same time, ecosystem competitiveness is not guaranteed by market size. It depends on whether models, computing power, data, developers, platforms, applications, and governance standards can be coordinated in a way that produces reliable and internationally acceptable services.

5.4. Governance challenges

5.4.1. Statistical classification and measurement

The first challenge is statistical classification. Existing digital-trade frameworks distinguish digitally ordered and digitally delivered trade and provide increasingly sophisticated guidance for measuring cross-border digital transactions [34]. However, practical classification remains difficult for model APIs, token consumption, agent execution, and cross-border inference services. If an overseas firm uses a Chinese model for customer support or code generation, the transaction may resemble software services, information services, data services, cloud services, or a new category of AI-enabled business service. Without a consistent classification framework, estimates of trade scale, productivity effects, and international competitiveness may not be comparable. China's digital-trade policy agenda already emphasizes the need to improve rules, systems, and innovation capacity [35], and AI-service measurement should become part of that effort.

5.4.2. Token standards and service comparability

The second challenge is comparability. Tokens provide granular usage data, but a token is not a standardized unit of service quality. Model-specific tokenizers, context windows, reasoning depth, latency, output quality, and task complexity mean that the same token count can represent different amounts of computing cost and user value. Yang and Zhang therefore describe tokens as measurement units for heterogeneous service flows rather than fully standardized commodities [18]. A viable cross-border market will require clearer quality signals, model-performance disclosure, service-level indicators, and standardized reporting of input, output, and inference-related usage.

5.4.3. Cross-border data governance

The third challenge is cross-border data governance. AI-service calls may include personal information, enterprise data, proprietary documents, business processes, and feedback data. Cross-border invocation therefore raises questions of privacy, cybersecurity, data localization, algorithmic transparency, content compliance, and liability. Huang et al. argue that trusted data spaces can support a model in which data are usable without unrestricted visibility and where purposes can be controlled and measured [21]. For international AI services, technologies and institutions such as privacy-enhancing computation, trusted data spaces, auditable access controls, and clear responsibility allocation may help reconcile data utilization with compliance.

5.4.4. Computing infrastructure and value conversion

The fourth challenge concerns the infrastructure beneath digital delivery. AI services appear intangible, but token generation depends on graphics processors, chips, electricity, data centers, networks, models, and technical labor. Huang and Zhao describe this transformation as converting electricity into computing power and computing power into intelligence [22]. Wu et al. similarly argue that computing-power value must be linked to intelligent labor and actual value creation rather than treated as an abstract technical metric [24]. For trade competitiveness, this means that the marginal cost and reliability of AI-service exports will remain sensitive to hardware access, energy efficiency, model architecture, caching, latency, and data-center deployment. High invocation volume will not automatically translate into high trade value unless it is converted into reliable, differentiated, and economically valuable services.

6. Conclusion and policy implications

Large AI models are not simply adding a new tool to existing digital services trade. They are reorganizing the logic of value creation. Chain-based GVCs emphasize sequential division of labor; intelligent service ecosystems emphasize networked coordination and feedback. Conventional software trade focuses on products, licenses, and predefined functions; AI services increasingly focus on callable capabilities. Traditional service pricing relies on contracts, working time, and subscriptions; AI services are increasingly metered through tokens, invocations, and service levels. The intelligent service ecosystem should therefore be understood as an extension of value-chain

DOI: 10.54254/2754-1169/2026.37180

analysis under conditions in which production, delivery, and use are continuously connected through digital infrastructure.

For China, the policy objective should move beyond the narrow idea of exporting more models. A competitive AI-services trade system requires an ecosystem capable of sustained supply, measurement, transaction, governance, and international expansion. First, statistical systems should develop clearer categories for model calls, token consumption, cross-border API revenue, agent services, and industry use cases, while remaining compatible with international digital-trade measurement frameworks [34]. Second, token metering should be complemented by quality and service-level standards so that usage is not only measurable but also comparable and auditable. Third, trusted and rule-based cross-border data mechanisms are needed to support enterprise adoption without weakening privacy or security. Fourth, computing infrastructure, energy efficiency, high-quality data, developer communities, and sector-specific applications should be treated as integrated sources of trade competitiveness rather than separate industrial-policy domains.

The broader implication is that the next stage of digital-services competition may be determined less by whether a country has a single high-performing model than by whether it can organize a stable, trusted, interoperable, and commercially viable ecosystem around models. China's large market and expanding digital-services base create opportunities for such a transition, but statistical, standardization, data-governance, infrastructure, and international-rule challenges remain substantial. Building an intelligent service ecosystem can therefore be viewed as both an industrial strategy and a trade-governance strategy for moving from participation in model markets toward greater influence over the organization and rules of AI-enabled digital services trade [22, 35].

References

[1] Gereffi, G., Humphrey, J., & Sturgeon, T. (2005). The governance of global value chains. *Review of International Political Economy, 12*(1), 78-104.

[2] Baldwin, R. (2016). *The great convergence: Information technology and the new globalization*. Harvard University Press.

[3] Jiang, X., & Luo, L. (2019). Globalization of services in the internet era: New engine, acceleration, and competitiveness of major countries. *Social Sciences in China*, (2), 68-91, 205-206. [in Chinese]

[4] Yue, Y., & Li, R. (2020). International competitiveness of digital services trade and implications for China. *China Business and Market, 34*(4), 12-20. [in Chinese]

[5] Meng, X., Sun, L., & Wang, H. (2020). The effects of digital services trade barriers and regulatory policy heterogeneity on digitally delivered services trade. *Asia-Pacific Economic Review*, (6), 42-52, 147. [in Chinese]

[6] Gao, H. (2023). An analysis of the international competitiveness of China's digital services trade. *Statistics & Decision, 39*(4), 158-162. [in Chinese]

[7] Chen, W. (2023). Digital economy development and the improvement of China's services trade: Evidence from provincial panel data. *Journal of Commercial Economics*, (21), 146-150. [in Chinese]

[8] Song, J., & Wang, Q. (2014). Determinants of international competitiveness in modern services trade: Evidence from cross-country panel data. *Journal of International Trade*, (2), 96-104. [in Chinese]

[9] Yue, Y., & Zhao, J. (2020). Characteristics and determinants of digital services exports: An analysis based on cross-country panel data. *Shanghai Journal of Economics*, (8), 106-118. [in Chinese]

[10] Zhu, F. (2021). Constraints and pathways for high-quality development of China's digital services trade. *Academic Forum, 44*(3), 113-123. [in Chinese]

[11] Zhao, F., & Feng, X. (2007). A comparative analysis of international competitiveness in China-U.S. services trade: Also on structural imbalance in China's services trade. *World Economy Studies*, (9), 42-48, 87. [in Chinese]

[12] Zhuang, H., Huang, J., & Chen, J. (2009). An empirical analysis of China's services trade competitiveness based on the diamond model. *Finance & Trade Economics*, (3), 83-89. [in Chinese]

[13] Brynjolfsson, E., Li, D., & Raymond, L. (2023). Generative AI at work. *NBER Working Paper*.

[14] Eloundou, T., Manning, S., Mishkin, P., & Rock, D. (2023). GPTs are GPTs: An early look at the labor market impact potential of large language models. Research report.

DOI: 10.54254/2754-1169/2026.37180

[15] Korinek, A. (2023). Generative AI for economic research: Use cases and implications for economists. Research report.

[16] Bai, C., Xu, H., & Li, X. (2024). Large-model-driven embodied intelligence: Development and challenges. *Scientia Sinica Informationis, 54*(9), 2035-2082. [in Chinese]

[17] Ren, B., & Feng, X. (2026). Logic and strategies for value realization in the token economy. *Reform*, online first. [in Chinese]

[18] Yang, X., & Zhang, J. (2026). Micro-mechanisms and institutional design of token trading markets: Evidence from local practices in China. *Contemporary Economic Management*, online first. [in Chinese]

[19] Wang, P., & Zang, M. (2026). Theoretical logic, model system, and institutional construction of token valuation. *Friends of Accounting*, (13), 10-23. [in Chinese]

[20] Zhou, W., & Yang, Z. (2026). Token economy and the cultivation and accelerated development of new quality productive forces in the intelligent era. *Journal of Chongqing University (Social Science Edition)*, online first. [in Chinese]

[21] Huang, Y., Li, T., & Guo, Q. (2026). Building trusted data spaces for the publishing industry driven by tokens: Theoretical logic, operating mechanisms, and implementation paths. *Digital Publishing Research, 5*(3), 1-10. [in Chinese]

[22] Huang, W., & Zhao, Y. (2026). Opportunities, challenges, and pathways for China's token-based AI services going global in the intelligent economy. *Inquiry into Economic Issues*, (7), 14-21. [in Chinese]

[23] Xu, P., & Liu, Y. (2026). New models for Chinese digital publishing going global from the perspective of token economics. *China Digital Publishing*, online first. [in Chinese]

[24] Wu, X., Qin, J., & Ge, Z. (2026). Exploring a theory of computing-power value with Chinese characteristics: Theoretical construction and practical pathways based on intelligent labor. *Urban Insight*, (2), 4-23. [in Chinese]

[25] Litowitz, A., Polson, N., & Sokolov, V. (2024). Photons = tokens: The physics of AI and the economics of knowledge. Research report.

[26] Xing, Y. (2025). AI token futures market: Commoditization of compute and derivatives contract design. Research report.

[27] Akpan, M. (2025). Beyond attention: Advancing AI token valuation through user engagement and market dynamics. Research report.

[28] Bara, M. (2024). PromptChain: A decentralized Web3 architecture for managing AI prompts as digital assets. Research report.

[29] Ko, P. S., & Chen, K. S. (2024). Discovering AI tokens in the fractal markets hypothesis and their time-frequency co-movements with the leading high-carbon cryptocurrency. Research report.

[30] Ministry of Commerce of the People's Republic of China. (2025). Development of China's services trade in 2024. Report. [in Chinese]

[31] Ministry of Commerce of the People's Republic of China. (2025). *China digital trade development report 2025*. Report. [in Chinese]

[32] Sturgeon, T. J. (2002). Modular production networks: A new American model of industrial organization. *Industrial and Corporate Change, 11*(3), 451-496.

[33] Ministry of Industry and Information Technology of the People's Republic of China. (2025). Operation of China's software and information technology services industry in 2024. Report. [in Chinese]

[34] International Monetary Fund, Organisation for Economic Co-operation and Development, United Nations Conference on Trade and Development, & World Trade Organization. (2023). *Handbook on measuring digital trade* (2nd ed.).

[35] General Office of the Communist Party of China Central Committee & General Office of the State Council. (2024). Opinions on reform, innovation, and development of digital trade. Policy document. [in Chinese]