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Development Models, Challenges, and Emerging Trends of Digital Procurement in China

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Abstract: ***The rapid growth of the digital economy and intelligent manufacturing has made digital procurement a key driver of supply chain transformation. While advanced economies have widely adopted artificial intelligence, big data, the Internet of Things, and blockchain to improve efficiency and transparency, China continues to face challenges in system integration, data security, and talent readiness. This paper addresses these gaps by examining the evolution, constraints, and optimization pathways of digital procurement in China. Drawing on policy documents, industry reports, case studies, and secondary literature, the study reviews national strategies, technological drivers, and industrial applications. The findings show that government initiatives and technological innovation create significant opportunities, especially in rapidly upgrading sectors such as new energy vehicles, logistics, and healthcare. Yet major obstacles persist, including fragmented platforms, insufficient training, and heightened risks from global uncertainties such as trade barriers and supply chain restructuring. Case analyses demonstrate that integrated collaboration platforms, business-value-oriented reforms, and digitally enabled supplier management can enhance transparency, reduce costs, and strengthen resilience. This study contributes by systematically mapping the trajectory of digital procurement in China, identifying internal and external constraints, and outlining a strategic roadmap to guide enterprises and policymakers in advancing digital–intelligent supply chain transformation.***

Keywords: Digital procurement, Digital supply chain, Digital economy, Intelligent transformation in China.

1. Introduction

In recent years, the accelerated development of the digital economy and intelligent manufacturing has positioned smart and digital supply chains as central drivers of innovation in global supply chain management. Major economies, including the United States and the European Union, have introduced policies encouraging the adoption of artificial intelligence (AI), the Internet of Things (IoT), big data, and blockchain in procurement and supply chain operations. These initiatives aim to improve transparency, enhance resilience, and promote sustainability. In China, the government has assigned strategic importance to digital intelligence, issuing a series of policies that present digital transformation as a critical pathway to modernizing supply chains and achieving high-quality economic development.

In March 2025, eight Chinese ministries—including the Ministry of Commerce, the National Development and Reform Commission, the Ministry of Education, and the Ministry of Industry and Information Technology—jointly issued the Special Action Plan to Accelerate the Development of Smart Supply Chains. The plan sets the goal of cultivating 100 leading smart supply chain enterprises nationwide by 2030 and building an integrated, intelligent, and efficient supply chain system. This initiative demonstrates the government's strong commitment to advancing smart supply chains and provides institutional support and policy guidance for enterprises seeking to expand their adoption of digital procurement and supply chain practices [1].

The concept of digital procurement is defined differently in academia and industry. Academic discussions often emphasize theoretical frameworks and managerial implications, whereas industry practices highlight technological applications and operational efficiency. Broadly, digital procurement refers to the use of advanced technologies to improve purchasing processes, supplier management, and overall supply chain operations, with the goals of increasing efficiency, enhancing transparency, and reducing costs. By adopting tools such as e-procurement platforms, data analytics, and AI, organizations can streamline workflows, minimize dependence on manual procedures and paper-based documentation, and transition toward automated, data-driven strategies. This transformation not only improves operational efficiency and cost control but also strengthens sourcing strategies and supplier selection by enhancing transparency and decision-making accuracy [2].

In China, the Federation of Logistics and Purchasing promotes a "digital procurement" model that emphasizes data centrality. This model integrates digital technologies and intelligent algorithms to support accurate demand forecasting, automated supplier matching, efficient logistics scheduling, and optimized inventory management [3]. Collectively, these perspectives suggest that smart procurement involves not only process automation and improved information sharing but also enhanced decision-making and autonomous collaboration enabled by intelligent systems.

The development of digital procurement in China is driven by national strategies, policy support, technological progress, economic restructuring, and enterprises' pursuit of cost reduction and efficiency. At its core, this transformation relies on policy incentives and advanced technologies to achieve deep supply chain integration and end-to-end optimization. These efforts are expected to enhance operational efficiency, lower costs, and strengthen supply chain resilience and competitiveness. Accordingly, this paper examines the opportunities, challenges, and optimization pathways of smart procurement in China. The analysis seeks to clarify its evolutionary trajectory and practical significance, while offering insights to support the digital and intelligent transformation of supply chain management in China. The healthcare supply chain plays a vital role in ensuring the

availability of medical supplies and pharmaceuticals, which is the second largest cost for hospitals after staffing expenses [1]. With rising global healthcare expenses, optimizing healthcare supply chain management is critical to enhancing operational efficiency and cost control. However, research indicates that the development of healthcare supply chains still lags behind that of commercial supply chains [2]. Traditional procurement and inventory management methods often result in either excess inventory or stockouts, both of which negatively impact the provision of healthcare services.

2. Opportunities for the Development of China's Digital Procurement

2.1 National Strategies and Policy Guidance

The Chinese government regards the digital economy and intelligent manufacturing as strategic drivers of national development and has introduced a series of forward-looking policies to accelerate this transformation. The 14th Five-Year Plan for the Development of the Digital Economy (No. 29 [2021]), released by the State Council in December 2021, set the goal of raising the added value of core digital industries to 10% of GDP by 2025, aiming to integrate digital technologies with the real economy and establish a modern digital economic system [4]. At the same time, the 14th Five-Year Plan for Intelligent Manufacturing, issued by the Ministry of Industry and Information Technology and seven other ministries, promotes the deployment of artificial intelligence (AI), the Internet of Things (IoT), and the industrial internet across the entire manufacturing life cycle—from design and production to service—in order to improve efficiency, reduce costs, and enhance competitiveness [5].

Together, these strategies provide a roadmap for technological innovation and business model reform, while also laying the institutional and technical foundations for the rapid development of digital procurement. Within this policy framework, companies are increasingly adopting big data analytics, intelligent algorithms, and IoT-based solutions to support demand forecasting, dynamic optimization, and end-to-end supply chain visibility. These applications reduce procurement costs, improve resource allocation, and strengthen value chain collaboration. Propelled by policy support and technological innovation, China is accelerating its transition from a "manufacturing powerhouse" to an "intelligent manufacturing leader," reshaping industrial capacity and generating sustained momentum for high-quality economic growth.

2.2 National Strategies and Policy Guidance

The rapid advancement of emerging technologies—such as the Internet of Things (IoT), artificial intelligence (AI), big data, and blockchain—is profoundly reshaping procurement and supply chain management, providing a solid foundation for the development of digital and intelligent procurement. IoT enables real-time data collection and interconnection across supply chain stages through sensors, radio-frequency identification (RFID), and related technologies, thereby enhancing visibility and responsiveness in procurement by allowing enterprises to monitor material conditions and logistics dynamics in real time [6].

AI also plays a central role in demand forecasting, supplier management, and risk assessment. Machine learning and deep learning models can identify patterns and perform predictive analytics on large-scale historical datasets, which significantly improve the rigor and accuracy of procurement decision-making [7]. At the same time, big data facilitates the transition from traditional experience-based practices to data-driven decision-making. By analyzing multidimensional information—including price fluctuations, supplier performance, and market demand trends—companies can dynamically optimize procurement activities and allocate resources more efficiently [8–9].

Blockchain technology further strengthens procurement by providing robust support for contract execution and supplier credit evaluation through its distributed ledger and immutability. It fosters trust among stakeholders, reduces transaction risks, and lowers compliance costs [10]. Taken together, these technologies enhance automation and intelligence in procurement while accelerating the shift from traditional to digital-intelligent models. Such approaches improve supply chain visibility and traceability, reduce costs, increase resource utilization, and promote collaboration and value co-creation across the supply chain. The deep integration of IoT, AI, big data, and blockchain thus serves as a critical enabler of efficient, transparent, and sustainable procurement systems, and will remain a key research direction in global supply chain management.

2.3 New Opportunities Arising from China's Economic Transformation

China's economy is undergoing a profound transition from high-speed growth to high-quality development, with industrial upgrading as the central driver. This transformation not only promotes structural change in manufacturing and services but also creates opportunities for the digital – intelligent transformation of procurement and supply chain systems. Traditional procurement models—characterized by inefficiency, high costs, and limited transparency—struggle to meet the demands of industrial upgrading and market competition. Manual processes are complex and error-prone, supplier management lacks systematic evaluation, and information asymmetries reduce logistics efficiency. In contrast, digital–intelligent procurement, supported by artificial intelligence (AI), big data, and the Internet of Things (IoT), streamlines processes, enhances accuracy, and strengthens supply chain flexibility and resilience, thereby unlocking new avenues for enterprise growth.

The manufacturing sector provides a compelling example. In the new energy vehicle industry, the stringent technological requirements and lengthy supply cycles of key components such as batteries and motors render traditional procurement inadequate for rapid iteration. Digital procurement systems allow firms to conduct real-time monitoring and collaborative management of suppliers, ensuring quality stability and timely delivery. Companies such as BYD and Tesla have adopted such systems to boost efficiency and responsiveness, consolidating their competitiveness in global markets. Comparable opportunities are increasingly evident in the service sector. Logistics enterprises leverage intelligent

algorithms to optimize transportation routes, financial institutions adopt digital technologies to improve risk management in supply chain finance, and healthcare organizations employ digital platforms to strengthen traceability and ensure the secure supply of pharmaceuticals and medical devices [11].

Overall, China's economic transformation is generating unprecedented opportunities for procurement and supply chains. By embracing digital–intelligent reform, enterprises can overcome the bottlenecks of traditional models while capturing growth potential from manufacturing upgrading and service-sector expansion, thereby achieving higher efficiency and stronger competitiveness.

3. The Current Development of China's Digital Procurement and Supply Chains

China's digital procurement is expanding rapidly, yet overall penetration remains limited, and many enterprises have not fully transformed their procurement systems. Recent studies trace the shift from traditional to digital procurement while noting persistent challenges in efficiency, transparency, and risk management. Against this backdrop, identifying viable transformation pathways—particularly for energy enterprises—has become both an urgent necessity and a critical lever of competitiveness. Official data show that in 2022 public procurement exceeded RMB 48 trillion, about 40 percent of GDP; in 2023 enterprise procurement rose to RMB 175.4 trillion, including RMB 17.2 trillion through e-commerce. The digital procurement rate increased to 9.8 percent, highlighting the vast potential for future growth [12].

The evolution of enterprise procurement can be divided into four stages: traditional, e-commerce, digital, and digital–intelligent. The traditional stage relied on manual operations, cumbersome procedures, and low transparency, with high risks of information asymmetry. E-commerce platforms introduced information sharing, convenient transactions, and price transparency, driving the shift to electronic procurement. In the digital stage, IoT and ERP systems enabled automation, data-driven decision-making, and stronger risk control. Today, in the digital–intelligent stage, advanced tools such as big data and artificial intelligence empower procurement, enhance supply chain collaboration, and allow firms to monitor markets in real time and adjust strategies swiftly. Each stage has not only improved efficiency but also expanded procurement's strategic role in value creation and innovation [12].

Government procurement illustrates this trajectory. In Hubei Province, the digital reform of procurement has progressed rapidly. Since launching an electronic transaction and data integration platform in 2023, the province has connected all 17 prefectures and cities, registered over 2,000 agencies, 57,000 suppliers, and 34,000 procurement entities, and integrated multiple electronic transaction systems and e-signature providers. By May 2025, the platform had executed more than 26,000 projects with a cumulative value of RMB 57.76 billion. By dismantling regional information barriers and enabling data flows, it has strengthened regulatory capacity through traceability, comparability, and comprehensive archiving. Building on this foundation, Hubei has advanced its "AI+" initiative, introduced a standardized "1+N" regulatory framework, and adopted the OFD document format to convert procurement documents into structured, machine-readable data. This innovation ensures document security and immutability while supporting end-to-end archival management, thereby establishing a new oversight model of "one project, one file; one stage, one trace" [13]. Looking ahead, as AI, IoT, and blockchain gain wider application, digital–intelligent procurement will continue to deepen. For enterprises—and energy firms in particular—embracing this transformation will not only enhance efficiency but also provide a vital driver of sustainable development [12].

4. Challenges Facing China's Digital Procurement

4.1 Security and Integration Challenges in China's Digital Procurement

In digital procurement environments, sensitive information — such as supplier quotations, technical specifications, demand forecasts, and inventory levels—remains highly exposed. Any leakage may cause severe financial losses and reputational harm. Yet many firms still lack robust data classification and access-control mechanisms, leaving information vulnerable across hybrid private–public cloud environments. The absence of rigorous security assessments during system deployment further compounds these risks, as source-code flaws and architectural weaknesses create opportunities for cyberattacks and data theft. The spread of mobile work, where procurement staff increasingly rely on apps, exacerbates these vulnerabilities due to weak mobile safeguards. Beyond security, system compatibility poses another barrier. Procurement involves diverse platforms—ERP, finance, warehousing, logistics, and supplier systems—yet inconsistent interfaces and data standards hinder integration. These challenges are especially acute between legacy systems and new platforms, while the uneven digital maturity of suppliers, particularly SMEs, intensifies difficulties. Internally, fragmented departmental initiatives produce isolated platforms, duplicative investments, and disjointed workflows that reduce overall efficiency [14].

4.2 Deficiencies in Talent Development and Organizational Adaptation

Although digital procurement platforms encompass extensive functionalities supported by complex algorithms and models, firms typically underinvest in training. Most programs emphasize operational skills while neglecting business logic, data standards, and risk management. Employees thus complete tasks mechanically but fail to grasp the system's strategic value, creating a paradox of "using without understanding, and understanding without applying." Training is also confined largely to procurement units, with insufficient engagement from upstream, downstream, and financial departments, undermining end-to-end value creation. More fundamentally, organizational reform lags behind technological adoption. Many firms treat digitalization as a matter of installing a system rather than restructuring processes, responsibilities, and governance. Executives often prioritize short-term results, while frontline employees show

limited initiative, producing gaps between strategy and execution. Persistent departmental silos and cost-centered performance assessments further constrain strategic thinking and discourage procurement professionals from pursuing supplier collaboration and long-term supply chain optimization [14].

4.3 Risks of Digital Procurement under Global Uncertainty

The increasing complexity of global economic and political conditions magnifies risks for digital procurement. Rising protectionism and de-globalization disrupt cross-border collaboration, as tariffs and technical barriers restrict access to international markets. For example, one photovoltaic manufacturer faced frequent procurement delays after losing visibility into European suppliers' production schedules, raising its delivery postponement rate to 15 percent. Geopolitical tensions further compound such uncertainty. At the same time, supply chain restructuring presents new challenges. To mitigate external shocks, many firms pursue regionalization and localization strategies, which require reconfiguring supplier databases, logistics algorithms, and data standards. A Chinese electronics firm shifting procurement from Southeast Asia to domestic suppliers discovered severe data-format incompatibilities, necessitating costly modifications amounting to several million RMB. Such cases underscore how global uncertainty not only complicates procurement planning and logistics execution but also imposes heavy adaptation costs, rendering the operational environment for digital–intelligent procurement increasingly complex [11].

5. Optimization Measures for Promoting Digital Procurement

5.1 Platform Integration and Process Optimization

Developing integrated supply chain platforms is fundamental to digital procurement. By dismantling information silos and linking procurement, order processing, warehousing, logistics, and customer service, firms can establish seamless end-to-end systems that enable data sharing, process integration, and greater agility. For example, an automobile manufacturer created a supplier management system through which suppliers uploaded certification and product information for automatic verification. Procurement staff could then initiate workflows with a single click, reducing repetitive tasks, while shared production plans and inventory data shortened delivery cycles by 23 percent and cut inventory levels by 18 percent. Such cases demonstrate how unified platforms improve transparency, enhance coordination, and provide analytical support for strategic decision-making [14].

5.2 Business-Value-Oriented Institutional Reforms

Institutional reform is equally essential for advancing digital procurement. Firms should align governance structures with business value by establishing executive-led committees to coordinate procurement, finance, and technology functions, ensuring unified strategies and clear responsibilities. Standardizing material codes and supplier data provides the foundation for integration with ERP and supply chain platforms, while streamlined approval mechanisms — delegating routine purchases and automating rules—improve responsiveness and reduce redundancy. Sustained transformation also depends on performance systems that incorporate metrics such as data utilization and process digitalization rates, tied to cost control and risk management, thereby incentivizing employees to embrace innovation. In addition, dynamic supplier management and strengthened data governance, supported by technologies such as blockchain, reinforce resilience, mitigate uncertainty, and ensure transparency [12].

5.3 Enhancing Supplier Management through Digital Technologies

Digital technologies are reshaping supplier management into a more systematic and efficient process. Multidimensional evaluation models allow firms to assess suppliers on environmental performance, product quality, and delivery capability, with weights reflecting their role in green supply chain strategies. This approach requires attention not only to emissions but also to sustainable sourcing, renewable energy adoption, quality-control systems, and delivery reliability. Beyond evaluation, digital platforms facilitate collaboration by enabling joint design, shared data, and continuous feedback. Contracts now increasingly specify responsibilities, benefit-sharing arrangements, and intellectual property ownership, with adjustments made as conditions evolve. This digitally enabled model of deep collaboration strengthens supply chain efficiency and resilience while advancing sustainability, intelligent operations, and value co-creation [15].

Taken together, these optimization measures provide a comprehensive roadmap for digital procurement. By integrating supply chain platforms, aligning institutional reforms with business value, and leveraging advanced technologies for supplier management, firms can build procurement systems that are not only more efficient and transparent but also more resilient and strategically oriented. Such measures equip enterprises to navigate competitive markets, adapt to technological disruption, and create long-term value in the global supply chain landscape.

6. Conclusion

This paper examined the evolution, challenges, and optimization of digital procurement in China within the broader context of global supply chain transformation. Government strategies and technological advances have accelerated this shift, but progress remains uneven. Persistent barriers include data security risks, fragmented system integration, limited talent development, and growing global uncertainties.

The analysis shows that integrated collaboration platforms, business-value-oriented reforms, and digitally enhanced supplier management can significantly improve efficiency, transparency, and resilience. For enterprises, the findings stress the importance of going beyond technology adoption to embrace organizational restructuring, cross-functional collaboration, and continuous talent development. For policymakers, they underscore the need to strengthen data

governance, establish unified technical standards, and create ecosystems that support small and medium-sized suppliers in their digital transition.

Ultimately, digital procurement should be recognized not merely as a technological upgrade but as a strategic necessity for China's high-quality economic growth. By addressing internal weaknesses and adapting to external uncertainties, enterprises can build competitive and sustainable supply chains, while policymakers can provide the institutional and regulatory foundations essential for long-term innovation and resilience.

References

[1] Ministry of Commerce, National Development and Reform Commission, Ministry of Education, Ministry of Industry and Information Technology, et al. Special action plan to accelerate the development of smart supply chains [EB/OL]. (2025-03-24) [2025-07-25]. Available at: https://www.gov.cn/zhengce/zhengceku/202505/content_7025257.htm

[2] Finio, M.; Downie, A. Digital procurement transformation and strategy [EB/OL]. (2025-03-13) [2025-08-03]. Available at: https://www.ibm.com/think/topics/digital-procurement

[3] China Federation of Logistics and Purchasing. 2025 smart procurement supply chain development report[R]. Beijing: China Federation of Logistics and Purchasing, 2025.

[4] The State Council of the People's Republic of China. The 14th Five-Year Plan for the Development of the Digital Economy [EB/OL]. (2021-12-12) [2025-08-12]. Available at: https://www.gov.cn/xinwen/2021-12/29/content_5665068.htm

[5] Ministry of Industry and Information Technology, National Development and Reform Commission, Ministry of Education, et al. The 14th Five-Year Plan for Intelligent Manufacturing [EB/OL]. (2021-12-29) [2025-08-12]. Available at: https://www.gov.cn/zhengce/content/2022-01/12/content_5667817.htm

[6] Taj S, Imran A S, Kastrati Z, et al. IoT-based supply chain management: A systematic literature review[J]. Internet of Things, 2023, 24: 100982.

[7] Delina R, Macik M. Quality of artificial intelligence driven procurement decision making and transactional data structure[J]. Quality Innovation Prosperity, 2023, 27(1): 103-118.

[8] Chen L. Big data-driven intelligent supply chain management research[J]. China Business and Market (in Chinese), 2022, 36(7): 45-53.

[9] Kusiak A. Smart manufacturing must embrace big data[J]. Nature, 2017, 544(7648): 23-25.

[10] Saberi S, Kouhizadeh M, Sarkis J, et al. Blockchain technology and its relationships to sustainable supply chain management[J]. International Journal of Production Research, 2019, 57(7): 2117-2135.

[11] Peng X, Zheng M, Xu W, Wei J, Zhao T. Research on development opportunities, risks and trends of China's digital and intelligent procurement and supply chain [J]. Supply Chain Management (in Chinese), 2025(9).

[12] Li M. Research on the digital and intelligent transformation of energy enterprise procurement in the digital age [J]. Contemporary Petroleum & Petrochemicals (in Chinese), 2025, 33(6): 51–55.

[13] Niu Q. Practical exploration of digital and intelligent supervision in government procurement in Hubei Province [J]. China Government Procurement (in Chinese), 2025(6): 17–18.

[14] Zhang T. Reform and challenges of enterprise material procurement under the background of the digital era [J]. Industrial Innovation Research (in Chinese), 2025, (13): 150–152.

[15] Zou M. Optimization of green supply chain procurement and supplier management driven by digital and intelligent technologies [J]. China Electronics Market (in Chinese), 2025(15): 58–60.