

A Brief Discussion on China's Digital Industrial Platform

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KEYWORDS

ABSTRACT

Digital Industrial Platform;
Industrial Internet;
Industrial Upgrading;
Supply Chain Resilience;
Intelligent Manufacturing

This paper explores the development background, core architecture, and driving role of China's digital industrial platforms in the industrial economy. By sorting out relevant policies, technological paths, and typical application cases, it analyzes the key value of digital industrial platforms in optimizing production processes, promoting resource collaboration, and empowering the transformation and upgrading of the manufacturing industry. Research shows that China's digital industrial platforms are gradually becoming core infrastructure supporting the intelligent, networked, and service-oriented development of the industry, and providing an important driving force for building a modern industrial system. Meanwhile, combined with research results related to supply chain resilience improvement and coordinated regional economic development in the digital economy, the linkage value of digital industrial platforms in multi-dimensional economic development is further highlighted, providing references for the coordinated promotion of manufacturing digital transformation and high-quality economic development.

INTRODUCTION

In recent years, against the background of the in-depth integration of new-generation information technology and the manufacturing industry, digital industrial platforms, as the core carrier of the Industrial Internet, have played an increasingly important role in the transformation of China's manufacturing industry. This process is mainly driven and shaped by a top-down, step-by-step national policy system.

From the macro-strategic level, the Ministry of Industry and Information Technology and other departments have successively launched a series of policies under the "Industrial Internet Innovation and Development Action Plan". These policies clarify a systematic development path covering the three major systems of network, platform, and security, as well as data integration and application. Their core goal is to build an intelligent manufacturing ecosystem covering the entire industrial chain and the entire value

chain, and consolidate the industrial digital infrastructure. Guided by this national blueprint, the "intelligent transformation and digital upgrading" policies actively responded to by local and industry authorities are more targeted. They aim to promote intelligent transformation and digital upgrading of a wide range of enterprises, especially small and medium-sized enterprises (SMEs), to address core pain points such as production efficiency, cost control, and quality management.

It is worth noting that SMEs, as an important part of the manufacturing industry, are closely related to the improvement of supply chain resilience in their digital transformation. Against the backdrop of the global industrial chain characterized by "fragmentation" and "networking" and frequent emergencies, the issue of supply chain vulnerability of SMEs has become prominent. Digital

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industrial platforms are one of the key carriers to solve this problem. By building a collaborative and intelligent platform ecosystem, they can help SMEs break through resource constraints and enhance the ability of supply chains to respond to risks [1].

Driven by both policy coordination and market demand, digital industrial platforms have been rapidly popularized and applied, becoming an important engine for promoting the high-quality development of China's industry. For example, the construction of smart factories in the petrochemical industry to achieve full-process optimization, and the establishment of intelligent safety monitoring systems in the civil explosive field. These practices are vivid manifestations of the above-mentioned core policy goals—realizing the optimization and safe control of the entire production process through platformization—in specific industries, which have significantly improved production efficiency and safety management levels [2].

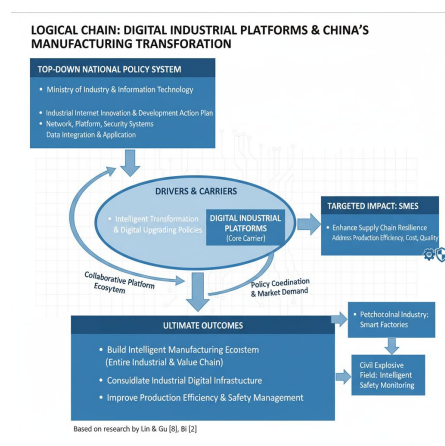


Fig.1.China's Digital Industrial Platforms

1.Core Architecture of China's Digital Industrial Platforms

1.1.Composition of the Technical System

China's digital industrial platforms are supported by new-generation information and communication technologies, mainly including the following key technologies:

- Industrial Internet Platform and Digital Twin:** Through equipment networking and data collection, a digital mapping of physical entities is constructed to realize full-process monitoring and optimization. Cases: Shanghai Tobacco Machinery has built a digital twin factory to optimize production control and environmental management; China Unicom's "Gewu Unilink" platform has aggregated more than 1,000 industry object models to quickly create equipment digital twins [3].
- Cloud Computing and Edge Computing:** Adopting a "cloud-edge collaboration" architecture to provide elastic storage and efficient computing for massive data, with edge-side processing of real-time tasks. Cases: Shanghai Tobacco Machinery has built a data empowerment system using a "cloud-edge collaboration + lake-warehouse integration" data architecture; China Unicom's "Gewu Unilink" has created a three-tier implementation architecture of cloud, edge, and end to realize industrial interconnection [4].
- Artificial Intelligence and Big Data Analysis:** Applying technologies such as machine learning and large models for process optimization, quality inspection, predictive maintenance, and intelligent scheduling. Cases: Shanghai Tobacco Machinery has built an intelligent fault diagnosis system based on large models, improving service response efficiency by 80%; Inspur Cloudzhou has launched the "Zhiye Large Model" to provide services such as process parameter optimization and intelligent customer service [5].
- Industrial Software Ecosystem:** Including Product Lifecycle Management (PLM), Manufacturing Execution System (MES), Enterprise Resource Planning (ERP), etc., which constitute the core tool chain for digital transformation. Case: The "Intelligent Manufacturing Typical Scenario Reference Guide" issued by the Ministry of Industry and Information Technology lists

CAD, CAE, PLM, etc., as core tools for product digital design [6].

1.2.Platform System and Standard Construction

China has initially formed a multi-level and collaborative digital industrial platform system, including cross-industry and cross-field platforms, characteristic professional platforms, and regional integrated platforms. This system is highly consistent with the logic of regional economic development. Through the regional layout and resource integration of platforms, it can alleviate problems such as differences in institutional flexibility between regions and obstacles to factor flow to a certain extent, providing technical support for the coordinated development of regional economies [7].

At the same time, the state continues to promote the construction of a standard system, covering data interfaces, security protection, interconnection, and other aspects, laying a foundation for platform interconnection and ecological co-construction. The specific platform types and standard construction cases are shown in the following table:

2.Impact of Digital Industrial Platforms on China's Industrial Economy

2.1.Improvement of Industrial Efficiency and Competitiveness

By realizing ubiquitous equipment connection, data-driven decision-making, and full-process business collaboration, digital industrial platforms have significantly improved production efficiency and resource utilization. From the micro-enterprise level, platforms can help enterprises optimize production processes and reduce operating costs; from the industrial chain level, platforms break down information barriers between enterprises, promote collaborative innovation between the upper and lower reaches, and form an industrial cluster effect. This is highly

consistent with the "ecological" development trend in the digital economy. By integrating resources through the platform ecosystem, it not only improves the competitiveness of individual enterprises but also enhances the risk resistance of the entire industry [8].

2.2.Contribution to the National Economy

The large-scale application of digital industrial platforms has promoted the transformation of industrial models and spawned new business formats such as platform economy and shared manufacturing. According to relevant research forecasts, by 2025, the scale of the core industrial Internet industry is expected to exceed one trillion yuan, and will continue to drive GDP growth . In addition, digital industrial platforms also play an important role in the coordinated development of regional economies. Through the technology diffusion and resource allocation functions of platforms, they can alleviate the gradient difference in technological innovation between regions, promote cross-regional factor flow, and provide a new path for narrowing regional economic gaps. At the same time, the green manufacturing model empowered by platforms is also consistent with the concept of "synergy between ecological governance and economic development" in environmental economics. It realizes energy conservation and emission reduction through digital means, and promotes the balance between economic growth and ecological protection .

3.Paths for Digital Industrial Platforms to Empower Industrial Transformation

3.1.Promoting Intelligent Production

Enterprises build intelligent production lines driven by "data + models" to realize adaptive adjustment of process parameters, precise energy consumption management, and full-process quality traceability. For example, an iron and steel enterprise has optimized the entire steelmaking process through a digital platform, reducing energy consumption per

ton of steel by 5% and product defect rate by 15%. This intelligent production model not only improves production efficiency but also reduces resource waste, which is in line with the goal of "reducing environmental costs and achieving sustainable development" in environmental economics.

3.2. Building a Digital Management System

Digital industrial platforms connect R&D, production, supply chain, and after-sales service links to form an integrated management capability. The integration of ERP, SCM, and CRM systems enables enterprises to quickly respond to market changes and achieve lean operations. For SMEs, this digital management system can be realized through "lightweight" platforms. They can access core functions without large-scale investment, effectively solving the pain point of limited resources for SMEs, and at the same time enhancing their supply chain resilience to cope with market fluctuations and emergencies.

3.3. Developing Platform-based Services

Based on the data analysis capabilities of platforms, enterprises can provide value-added services such as remote operation and maintenance, energy efficiency management, and collaborative design to the outside world, realizing the transformation from "manufacturing" to "manufacturing + service". This service model not only expands the profit space of enterprises but also promotes the upgrading of industries to high-value-added links. In addition, platform-based services can also promote cross-regional and cross-industry cooperation, facilitate the coordinated development of regional economies, and drive the industrial upgrading of underdeveloped regions through service output, narrowing the regional development gap.

4. Benefit Analysis of Digital Industrial Platform Development

4.1. Economic Benefits

Cost Reduction, Efficiency Improvement for Enterprises, and Profitability Enhancement

The application of platforms directly helps enterprises optimize production processes and reduce operating costs. AVIC Hongdu has realized refined and dynamic management of manufacturing costs through data-driven approaches, reducing the raw material cost of a single model. By establishing lean assembly units, it has improved production preparation efficiency and production efficiency, while reducing the number of front-line employees. Guangxi Huasheng New Materials Co., Ltd. has applied AI technology to promote intelligent management and control of the alumina production process, increasing labor productivity by 50% and production efficiency by 60%. Enterprises in the composite material industry cluster in Zaoqiang, Hebei, have reduced raw material procurement costs by approximately 6%, increased production efficiency by more than 10%, and reduced unit product costs by approximately 4% through the "Composite Material Shared Intelligent Manufacturing Industrial Internet Platform".

Driving Industrial Chain Collaboration and Forming Cluster Competitiveness

Platforms break down barriers between enterprises and realize resource sharing and collaborative innovation. The shared manufacturing platform in Zaoqiang, Hebei, has integrated 187 upstream and downstream enterprises, forming a scale effect by aggregating procurement needs. It has also integrated 9 shared factories, 21 standardized intelligent workshops, and 176 sets of equipment, allowing SMEs to "rent on demand", which has effectively improved the resource allocation efficiency and risk resistance of the entire cluster. The first batch of "shared park-in-park" in Xingtai, Hebei, has realized the agglomeration and efficient allocation of manufacturing resources through a shared platform, increasing the production efficiency of settled

enterprises by 35%, reducing costs by 15%, and increasing profits by 20%, realizing the transformation from "fighting alone" to "ecological win-win". This cluster collaboration model is an important manifestation of the "ecological" supply chain in the digital economy, which significantly enhances the overall resilience of the industrial chain.

4.2.Social and Environmental Benefits

Facilitating Green Manufacturing and Energy Conservation and Emission Reduction

Platforms provide precise digital means for the green transformation of high-energy-consuming enterprises, which is consistent with the research conclusion in environmental economics that "balancing ecological protection and economic development through technical means". A North China power transmission and transformation equipment manufacturing enterprise has reduced comprehensive energy consumption by approximately 20% by deploying Advantech's iEMS intelligent energy management system, saving 3-4 million kWh of electricity annually. After energy-saving optimization of its air compressor station, the energy-saving rate has also reached 20%. Hare Company has built a "source-network-station-load-storage" five-level linked intelligent heating platform to realize dynamic control of the heating system, saving more than 49,400 tons of standard coal annually. Through unit transformation, it has further reduced power supply coal consumption and carbon emission intensity [9]. Jiugang Group Dongxing Aluminum Co., Ltd. has implemented energy-saving and carbon reduction projects through digital transformation, saving 75.58 million kWh of electricity throughout the year and reducing carbon dioxide emissions by 42,000 tons. At the same time, its photovoltaic power generation project reduces carbon dioxide emissions by 47,000 tons annually [10].

Promoting the Popularization of Digitalization in SMEs and Improving Employment Quality

Platforms lower the threshold for digital transformation of SMEs and promote the upgrading of labor skills. The aforementioned shared intelligent manufacturing platform in Zaoqiang, Hebei, provides technical support for SMEs by integrating resources. The platform has carried out 3,682 person-times of technical training for settled enterprises and opened 11 laboratories and 53 core patent technology document libraries to enterprises, effectively improving the technical capabilities and product quality of SMEs. This model of popularizing digitalization in SMEs also alleviates the unbalanced development caused by "technological innovation gradient differences" between regions, laying a foundation for the coordinated development of regional economies. In addition, Xunyang City has explored a "one database, one chain, four platforms" digital employment service model. By establishing a human resource information database, it accurately connects enterprise employment needs with individual job-seeking needs. By August 2024, it has promoted the transfer and employment of 91,200 laborers. The city has also integrated resources to carry out order-based skill training to help workers master professional skills. For example, the "Xunyang Construction Engineering" labor service brand has driven the export of more than 60,000 construction workers .

BENEFIT ANALYSIS OF DIGITAL INDUSTRIAL PLATFORM DEVELOPMENT

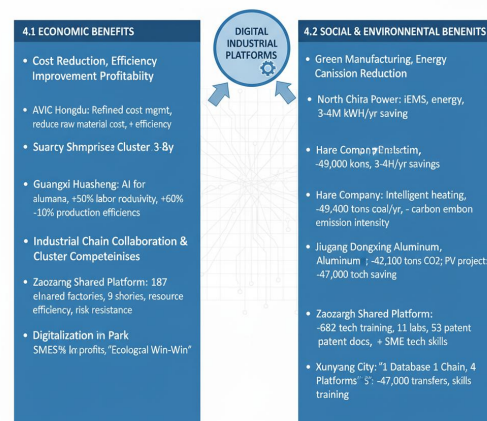


Fig.2.Benefit Analysis of Digital Industrial Platform Development

Conclusion

As a key carrier for the digital transformation of the manufacturing industry, China's digital industrial platforms have demonstrated strong empowerment potential in many aspects such as improving industrial efficiency, promoting green manufacturing, and facilitating regional collaboration. From the perspective of related research, digital industrial platforms form in-depth linkages with fields such as supply chain resilience improvement, coordinated regional economic development, and ecological and economic collaboration. Through the "lightweight" and "ecological" platform design, they help SMEs break through resource bottlenecks; through technology diffusion and factor allocation, they alleviate unbalanced regional development ; through digital green manufacturing, they realize the balance between ecological protection and economic growth .

In the future, with the continuous strengthening of technological iteration, ecological improvement, and policy support, digital industrial platforms will further promote the development of China's manufacturing industry towards high-end, intelligent, and green directions. At the same time, they will play a more core linking role in the coordinated development of multi-dimensional economies, providing a solid foundation for building an independent and controllable modern industrial system and realizing high-quality economic development.

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