

Exploring the Empowerment of Digital Technology in Promoting Industrial Integration and Regional Economic Development

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Abstract: To better analyse the patterns, pathways, and endogenous forces of China's industrial digital transformation, an empirical analysis was conducted on three regions: Jiangsu, Guangdong, and Henan, using the case study method. This includes a graded practice of industrial digital transformation in six provinces including Shanxi, Guizhou, and Ningxia, and a review of their degree of digitization. Three types of provinces were identified: innovation-led, steady-growth, and development-cultivation, along with their respective transformation patterns. Then, an analysis was carried out on these regions. Through the analysis of four elements, the driving mechanisms of regional industrial digital transformation were revealed, and considering the urgent requirements and constraints for industrial digital transformation at present, paths and strategic suggestions for realizing industrial digital transformation were provided.

Keywords: Regional Development; Industrial Economics Digital Transformation; Mechanism Model; Path of Transformation; Suggested Response Measures

1. Introduction

In recent years, China has introduced a series of policies to accelerate industrial informatization. The scale of industrial digitization has been growing at an annual rate of over 25% since 2005. By 2020, it accounted for 80.9% of the digital economy and 31.29% of GDP, becoming the leading force in the digital economy. As China steps into high-quality development, the regional economic development environment and situation are undergoing profound changes, and the digital industrial economy will reshape regional competition patterns.

This article will deeply analyse the current situation and characteristics of industrial digitization in typical regions of China, explore its internal laws, and analyse the transformation driving mechanisms, patterns, and development paths. The aim is to provide a reference for seizing the opportunities of the new generation of information technology revolution and industrial transformation, and to accelerate the transformation of industrial digitization.

1.1 Industrial Digitization and Regional Economic Development

Research on industrial digitization in China mainly focuses on its overall status, problem countermeasures, and the digitization mechanism of specific industries and regions. Yang Zhuofan^[1] divides the development mode of industrial digitization in China into "reverse driving" and "value-added", advocating for the promotion of "digital infrastructure", optimization of "supply chain", and expansion of "industrial chain" and "value chain". Liu Tao's team^[2], based on a survey analysis of 813 small and medium enterprises (SMES), has proposed policy suggestions for the lack of understanding, weak foundation, and existing obstacles in the digitization transformation of SMES.

Li Yueqi^[3] and others, from an industrial perspective and taking the automobile industry as an example, have analyzed the role mechanism and characteristics of innovation in promoting industrial upgrading, and have proposed strategic countermeasures. Liu Zhiyan^[4] believes from a regional perspective that consumption upgrading, technological innovation, and institutional policies are

important driving forces for the transformation of urban economy towards green, humane, and smart development.

Currently, issues such as the macro mechanisms, models, and paths of digital transformation have been deeply explored, but the attention to the models, methods, and paths of digital transformation within the region is not sufficient. This project plans to take the digital transformation of the Chinese regional industry as the entry point. Through the analysis of the characteristics of the digital transformation of the typical regional industry, it will summarize the driving mechanism of the digital transformation of the Chinese regional industry and study its transformation paths and promoting strategies.

2. Analysis of the Path of Industrial Digital Transformation in China's Regions

2.1 Regional industrial development model represented by digital technology

The "China Two-way Integration Development Data Map" reveals 2020 data that indicates a significant disparity in regional development across the country, mainly divided into three levels. The first level includes Jiangsu, Shandong, Zhejiang, Shanghai, Beijing, Guangdong, Chongqing, Tianjin, Fujian, and others; the second level includes Hubei, Henan, Hebei, etc., and the third level is concentrated in the Northeast, Northwest, and Southwest regions. The modes and paths of industrial digitization transformation in different regions vary due to differences in resource endowments and industrial bases.

2.2 Regional Industrial Digitization Transformation Models

This article defines the regional industrial digitization transformation models of three echelons as Comprehensive Leading type, Balanced Growth type, and Development Cultivating type.

1. Comprehensive Leading type: This model is characterized by the innovative application of new technology integration, with Jiangsu and Guangdong as examples. These regions have no obvious shortcomings in industrial digitization development, and they use digital technology to stimulate the development of new models and new formats, achieving high-quality economic development. These regions have a good digital foundation and economic development level. They can quickly identify the direction of industrial development and formulate corresponding policies. Through special planning, major projects, etc., they carry out work such as tackling core technologies and nurturing platforms, promoting the development of new models and new business forms, and accelerating the pace of industrial digitization transformation.

2. Balanced Growth type: This model uses the construction of digital infrastructure as the entry point, such as Henan and Shanxi. These regions can closely follow the national development strategy requirements, promote the layout of the integration application of a new generation of information technology, vigorously develop new types of infrastructure such as 5G and the industrial Internet, accelerate the digital transformation and upgrading of traditional industries, promote the integration and open sharing of manufacturing resources, and fully demonstrate the typical role of enterprises through pilot demonstrations to promote the deepening development of industrial digitization.

2.3 Regional Industrial Digitization Transformation Driving Mechanism

During the promotion of industrial digital transformation in various regions of China, factors such as geographical conditions, industrial foundations, and characteristic resources are considered. The process is generally divided into four major elements: environment, technology, industry, and ecology.

(1) Optimization of the Regional Industrial Digital Environment

The environment provides the foundation for industrial digital transformation, which mainly includes policy, market, innovation, and public services. The policy environment promotes transformation through relevant policies, the market environment addresses the financing difficulties of small and medium-sized enterprises through financial institutions, the innovation environment provides various supportive services through various types of science and technology innovation centres and autonomous innovation demonstration zones, and public services enhance the transformation capabilities supply through various means.

(2) Upgrade of Regional Digital Technology Iterations

The upgrade of digital technology iterations mainly includes infrastructure, basic technology, and innovative technology. Infrastructure construction supports new infrastructure through policies and funding, core technology promotion strengthens the tackling of key technologies through increased investment in basic research, and innovative digital technology is promoted by key

laboratories to drive advanced technological innovation and upgrade.

(3) Deepening of Regional Industrial Digital Transformation

The deepening of industrial digital transformation includes industrial structure upgrade and the formation of characteristic transformation paths. The upgrade of industrial structure gives new life to traditional industrial sectors through digital transformation, while characteristic transformation paths ensure the effective realization of transformation goals by choosing appropriate transformation paths and forming specific modes.

2.4 Design of the Regional Industrial Digital Transformation Path

Based on the regional industrial digital transformation model and driving mechanism, considering the constraints and market demands, we propose a transformation path that consists of "current status survey-strategic framework formulation-transformation implementation-evaluation and appraisal-strategic framework iterative improvement".

The design of the regional industrial digital transformation path covers five major steps:

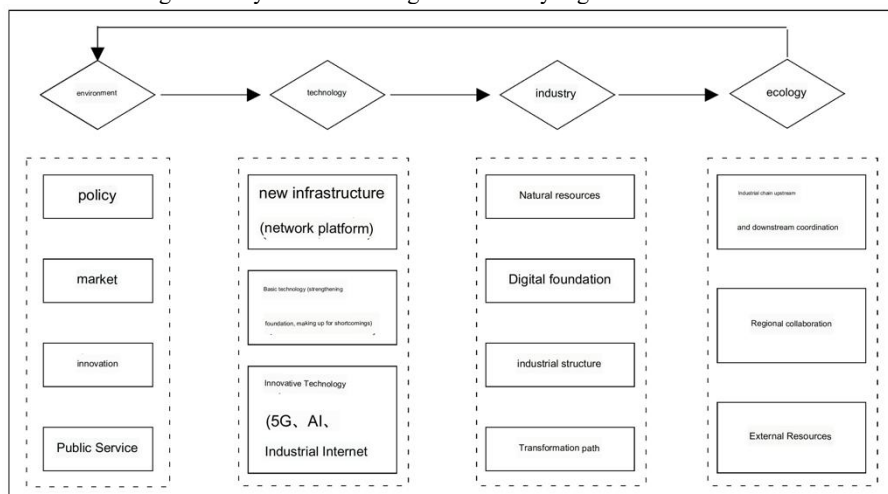
The first step is the status survey. By analysing the regional industrial base, the level of digitization, and solutions, etc., we can determine the focus and type of transformation and plan the path.

The second step is the formulation of the framework. This revolves around the transformation goals, roadmap, and key tasks to resolve the targets and methods of digital transformation. Goals are based on local resources and industrial characteristics, while the roadmap and tasks are designed according to the actual situation of the industry.

The third step is the implementation of the transformation, which involves policy formulation, promotion of key projects, and supporting financial support. Formulating policies that encourage and support, paying attention to the integrated application of a new generation of technology, and providing financial support.

The fourth step is evaluation and appraisal. First, clarify the evaluation indicators and methods, construct scientific evaluation indicators, and then carry out implementation evaluation and result feedback to help the government fully understand the status and progress of the transformation, and scientifically formulate the transformation strategic framework and related policies.

Figure 1 Key elements of regional industry digital transformation



Conclusion

The accelerated development of a new generation of information technologies such as cloud computing, the Internet of Things (IoT), and big data has made the digital economy a key engine for global economic and social transformation, and it has played a promoting role in the high-quality development of China's economy. Industrial digitization, as a crucial path for the integration of the digital economy and the real economy, has become an essential strategy for China's development. The evaluation results can be used for iterative optimization of the strategic framework to deepen the advancement of the transformation process. These steps affect each other and require continuous adjustment and optimization.

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