

# A Theoretical Study of Digital Economy Empowering Value Chain Remodeling in Yangtze River Delta City Cluster in the Context of a “dual circulation” development pattern

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## Abstract

**In the context of promoting the construction of a new double-cycle development pattern and the supply-side structural reform in China, digital economy-enabled value chain remodeling gradually becomes a powerful driving force for higher quality development in the Yangtze River Delta region. This paper aims to qualitatively study the effects and mechanisms of digital economy-enabled value chain remodeling in the Yangtze River Delta city cluster from the theoretical aspect, so as to promote the development of digital economy and high-end extension of value chain in the Yangtze River Delta city cluster.**

## Keywords

**Dual circulation, digital economy, value chain, theoretical study.**

## 1. Introduction

### 1.1. Research Background

Digital economy has become an important driving force of China's economic development. According to the data of China Academy of Information and Communication, from 2016 to 2021, the scale of China's digital economy increased from 22.6 trillion yuan to 45.5 trillion yuan, an increase of 1.01 times, with the total volume steadily ranking second in the world and accounting for 39.8% of GDP. Among them, the strength of the foundation of digital industrialization continues to consolidate, and the digitalization of industry enters the accelerated track of deep development. Overall, the digital economy has now become an important driving force of China's economic development.

China's digital infrastructure construction is actively promoted and the market scale is leading worldwide. On the one hand, data centers have become the main place for information generation, aggregation, integration and dissemination, and the driving engine for the rapid growth of digital industrialization. According to the Digital China Development Report (2021), China will form the world's largest Internet infrastructure in terms of volume and world-leading technology level. As of the end of 2021, the total rack size of data centers in use in China was 5.2 million sets, with the largest data centers accounting for about eighty percent or more of the tooth tracks. On the other hand, the rapid development of 5G is laying a solid foundation for convergent infrastructure and the deepening of industrial digitization. According to the latest statistics from China's Ministry of Industry and Information Technology, by the end of

July 2022, China had completed the opening of a total of 1.968 million 5G base stations, accounting for more than 60 percent of the world's total.

The market of computing power industry is promising as the computing power keeps improving. Arithmetic is a new type of productivity, a key "base" to support the development of digital economy and society, and an important innovation engine to stimulate the creativity of data elements, drive the digital transformation of the economy and promote the construction of digital government. According to the China Academy of Information and Communication Technology, in 2021, China's data production reached 6.6ZB (1ZB equals 1 trillion GB), accounting for 9.9% of the total global data production (67ZB), second only to the United States and ranked second in the world; and in the past three years, data production has maintained an annual growth rate of about 30%. Driven by both the demand brought by the rapid growth of data volume and the development of new infrastructure, China's data center market size has also maintained a high growth rate of over 25% in the past 3-4 years.

Smart manufacturing companies still have room for progress, and high-end manufacturing has great potential for future development. In 2011, the maturity level of intelligent production of 69% of Chinese industrial companies was at level 1 or below. In April 2011, the Ministry of Industry and Information Technology's "14th Five-Year Plan for Intelligent Production (Draft for Public Opinion)" clearly proposed that by 2025, the proportion of intelligent robots of the above-mentioned manufacturers in China with technical maturity level of Type II and above would reach 50%. Under the guidance of national policies, the trend of digital transformation and upgrading of China's manufacturing enterprises has been confirmed.

Top-level design continues to improve, the digitalization process continues to sink, helping the digital economy to become stronger and bigger. On July 25, 2022, the General Office of the State Council issued a letter approving the inter-ministerial joint meeting mechanism for building a large digital economy and social development strategy under the responsibility of the National Development and Reform Commission, marking the top-level design of the digital economy has been improved, and in the future, China will promote the implementation of the digital economy strategy more systematically and comprehensively from top to bottom. On August 17, 2022, the Ministry of Industry and Information Technology and the Ministry of Finance jointly issued the Notice on the Pilot Work of Financial Support for Digital Transformation of SMEs", which intends to support localities to carry out pilot digital transformation of SMEs through central financial funds. With the continued promotion of policies at the national level, each region has also issued corresponding policies, focusing on the proportion of the value added of the digital economy to GDP and the scale of digital economy-related industries in the future, in line with the implementation of the national blueprint for digital economy development.

## **1.2. Research significance**

### **1.2.1. Theoretical significance**

On the basis of sorting out the characteristics of digital economy development and the current situation of value chain in the Yangtze River Delta city cluster in China, this paper explores the inner mechanism of digital economy-enabled value chain remodeling from both micro and macro levels, thus promoting high-quality economic development and the construction of a new development pattern. It enriches the theoretical system of digital economy, high-quality integrated development of city cluster economy and value chain remodeling in China, and provides theoretical support for digital economy-driven value chain remodeling and high-quality integrated development among city cluster regions.

### **1.2.2. Realistic meaning**

The key to smooth domestic circulation is to reform the factor market and improve the market economy system, and promoting domestic and international circulation requires us to take the

initiative to improve the industrial chain and enhance our position in the value chain. By studying the inner mechanism and realization path of digital economy-enabled value chain reshaping in city clusters, we can help promote higher-quality integrated development of Yangtze River Delta city clusters and realize the transformation of old and new industrial dynamics, and enhance the dynamics of high-quality development in less developed regions.

### 1.3. Current status of research and literature review

The term "digital economy" can be traced back to the 1990s, after which different scholars have defined the concept of digital economy [1-2]. The definition of digital economy used in this paper is "digital economy refers to a series of economic activities that use digital knowledge and information as key factors of production, modern information networks as important carriers, and the effective use of information and communication technology as an important driving force for efficiency improvement and economic structure optimization". The technological changes and innovations brought by the digital economy, which improve labor productivity and total factor productivity, are fundamental to high-quality economic development [3]. Many literatures are investigating the theoretical mechanisms and targeted paths for the digital economy to empower China's high-quality economic development [4-5].

The current new round of industrial revolution with digitization and intelligence as the core is at the critical stage of moving from the introduction period to the expansion period, and as the basis of the new wave of technology, the digital economy with digitization and intelligence provides opportunities for high-quality development and promotes the reshaping of the value chain [6]. In terms of value chain reshaping, different scholars have conducted research from different perspectives. From the perspective of demographic transformation, Jim Li argues that the "qualitative transformation" of the population will reverse the effect and new kinetic energy, thus driving China's manufacturing industry to climb up the global value chain [7]. Feng Li finds that import trade affects resource allocation in the domestic value chain division of labor, i.e., it promotes the development of NVC1 to the detriment of the cultivation of NVC2 [8]. Other scholars also study enabling value chain reshaping from the perspectives of "Belt and Road" construction, circular economy, knowledge division of labor, and enterprise informatization [9-10].

In summary, existing scholars' research on digital economy empowerment and value chain remodeling is separate and mainly carried out from the national level, and there is less research literature on digital economy empowerment and value chain remodeling under the double-loop development pattern of urban agglomerations. At the same time, using most of the analytical results is limited to statistical measurements and comparative descriptions, without further research and theoretical elaboration on the relationship between the two. Compared with previous studies, the contribution of this paper may be: (1) to construct the inner connection and growth relationship between digital economy empowerment and value chain remodeling based on the perspective of urban clusters, and to analyze the inner law and theoretical connection using entropy value method and panel regression data model. (2) Analyze the formation of digital economy empowerment dual-loop development pattern from the perspective of value chain reshaping. It can provide suggestions for governments at all levels to formulate policies that are consistent with economic and social development, digital transformation of enterprises and value chain reshaping in the context of double-cycle development policies, and contribute to the construction of the double-cycle pattern.

## 2. Theoretical Discernment

After forty years of reform and opening up, China has seen important shifts in its participation in the world, with important progress in the scale and structure of foreign trade. As China's market economy flourishes, the economy produces a shift in comparative advantage, i.e., the

original competitive advantage is gradually shrinking and losing, but new competitive advantages are also developing. China's future competitiveness is first and foremost manifested by a strong domestic market and the dividend of labor quality. In addition, the relatively sound domestic infrastructure and the level of production support have become new resources for us to invest in the next phase of the world market. The change of comparative position requires us to change the development direction of our national opening strategy from traditional export to value chain upgrading. The world production value chain curve reflects the significant differences in labor productivity of each developed country or region caused by being at different stages of upgrading the world value chain. Compared to traditional labor-intensive links, capital- and technology-intensive links have a greater added role, with development and manufacturing, complex parts production, etc. located on the left side of the productivity smile curve, and technology- and service-intensive links on the other side. In the context of internationalization, manufacturing upgrading is mainly reflected in the upgrading of the value chain from the low-value labor-intensive stage by the higher-value capital-technology stage, or by the technology- and service-intensive stage.

In the construction of a double-loop business system, China's competitive strength can be effectively formed only by embedding the country's world value chain and leading the formation of regional world value chains. And there are many factors and methods to promote value chain reshaping and extension to the high end. We choose the digital economy as an explanatory variable to study its impact on the reshaping of the regional value chain in China's Yangtze River Delta. The reasons are the following two:

In recent years, especially in 2021, the digital economic growth rate of the three provinces and one city in the Yangtze River Delta exceeded the GDP growth rate of the same period by more than five percentage points, and the penetration rate of the digital economy in the three major industries also exceeded 40 percent. As the demonstrator of China's digital economy industrialization, the leader of China's industrial digitalization, the advocate of enterprise digital management, the explorer of data and information value and the practitioner of digital transactions in the new era, the Yangtze River Delta region has become an important force in promoting the integrated development of high-quality economy in the Yangtze River Delta, so it is important to study the impact of digital economy on value chain reshaping and industrial transformation and upgrading in the Yangtze River Delta region. Therefore, it is important to study the impact of the digital economy in the Yangtze River Delta region on the reshaping of value chain and industrial transformation and upgrading.

In the context of the new digital economy, the reconstruction of international value chain systems has shown a regionalization trend led by nearshore outsourcing and complemented by reshoring, while complex value chain systems have tended to converge and a change in corporate governance architecture with just-in-time manufacturing supply chain management and big digital platform services as the core drivers has occurred. Information technology has reduced national labor cost gaps and facilitated regional value chain development, while local institutional quality gaps and regional trade agreements have reinforced this trend. Therefore, it is of great significance to study the digital economy-enabled value chain reshaping in the Yangtze River Delta city cluster, which has become the most economically prosperous and urbanized region with the largest urban agglomeration in China, as well as one of the most dynamic regional economic developments in China's economic and social development.

### 3. Conclusions and Recommendations

First, China's urban agglomerations, mainly the Yangtze River Delta urban agglomerations, actively promote integrated, high-quality regional development, with a regional strong dynamic market economy, constantly promote the rapid flow of production factors, promote

collaborative and integrated industrial development, digital transformation of enterprises and the flow of talent, promote the integration of industry, academia and research across administrative boundaries, three-year (industrial chain, innovation chain, value chain) integration, cooperation in building world-class industrial clusters. The company also aims to improve the energy and safety of the industrial chain and international competitiveness, and realize the linkage planning of the Yangtze River Delta city cluster, new infrastructure facilities and industrial system.

Adhere to the innovation driven development strategy. For the province and the cities under its jurisdiction, on the one hand, it is necessary to continue to promote the continuous gathering of innovation elements and the free flow in the market, so as to promote the realization of market-oriented pricing of innovation elements, and at the same time, it is necessary to accelerate the construction of innovation city clusters, strive to improve innovation capabilities, and build an emerging innovation system closely coordinated with industry, finance, science and technology and education. On the other hand, it is necessary to continue to increase the investment in education funds for efficient research institutions, strive to increase the proportion of research and development funds of universities, especially the proportion of research funds for public basic topics, and increase the funding tilt and policy guarantee, so as to attract more and more high-level research universities, first-class research institutions and innovation leading enterprises to settle in, thus constantly promoting the rapid development of innovation in China.

Secondly, the technology-led future and innovation-driven development of the Yangtze River Delta city cluster is centered on technology to promote changes in traditional trade patterns and new changes in development models in the context of the digital economy, thereby effectively enhancing the status of the regional and Chinese markets in the global value chain and actively promoting the achievement of common prosperity at home. With 12% of global trade in goods currently conducted through cross-border e-commerce and 50% of cross-border trade in services realized in digital form, digital trade has become a new high point for countries to seize trade growth today. As the leader of China's innovative development and digital development, the Yangtze River Delta city cluster will actively develop digital trade to promote high quality and more integrated economic development in the region and boost the position of the Chinese market in the global value chain.

Adhere to building strategic industrial clusters and unblock the context of modern industrial system. The manufacturing industry is the support of the real economy, the foundation of China's founding and power, and plays a decisive role in the high-quality development of China's economy. Specifically, first, we should focus on strengthening and improving the innovation, scientific research and development and marketization level of strategic pillar industries; Second, relevant local governments should constantly promote the layout and policy arrangement of frontier strategic emerging industries, and inject strong momentum into the smooth domestic circulation; Third, we will continue to cultivate a number of specialized and new enterprises and build the spirit of craftsmanship. Build a digital data collection and processing platform, and constantly strengthen the ability to collect and process data; Fourth, we should constantly strengthen cooperation and deepen exchanges with domestic regions in terms of capacity expansion, industrial chain extension, market channel development, etc. We will continue to promote positive interactions and official exchanges between the Yangtze River Delta, Beijing Tianjin Hebei and other urban agglomerations.

Third, digital trade will effectively promote the "double cycle" of commodity flow, capital flow and logistics. From the consumer side: digital trade brought about by the digital economy will effectively promote the double cycle of commodities, capital and logistics as well as high-quality development, promote the market-oriented allocation of global production factors, better promote the construction of institutions and mechanisms of commodity circulation services,

attract global commodities and resource factors into the Bureau, so as to better promote the domestic and international circulation. China should adhere to the strategy of integrating domestic and foreign trade, stabilize the basic foreign trade market, and constantly improve the construction of a unified domestic market in order to improve the level of domestic consumption. It is necessary to enhance the adaptability and reliability of the endogenous power of the domestic large circulation system, and also to improve the quality and level of the international circulation, so as to promote the high-quality construction of the new development pattern of internal and external double circulation.

Fourth, the development of the digital economy in the Yangtze River Delta city cluster will bring the industry to focus more on specialization and segmentation, which is conducive to promoting the coordination and cooperation of the components and establishing an environment of professional operation and healthy competition from the supply side: digital economy empowerment, making the industries more specialized and segmented, deepening the structural reform of the supply side, digital innovation-driven development, high-quality supply.

To lead and create new demand. At the same time the segmentation of professional and industry technology, which in turn brings innovation in science and technology, will promote a higher level of openness to the outside world.

Fifth, the supply chain of the digital economy is more intelligent, which is conducive to the migration and cooperation of the industrial chain and the formation of a new pattern of domestic and international mutual promotion. The flow of digital technology and data will promote a more intelligent, customized and efficient integration of the supply chain. At the same time, through the optimization and adjustment of industrial structure and layout between regions, this will promote the transfer and undertaking of industrial chains, which will promote more effective and close cooperation and development between regions, thus promoting a higher level, high quality and integrated development and enhancing the development momentum of less developed regions.

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