

New Infrastructure to Help High-Quality Development of Digital Economy in Jiangxi Province

Yishu Liu^{1,a}, Ziyuan Li^{2,b,*}

¹School of Economics and Management, Nanchang Normal College of Applied Technology, Nanchang 330108, Jiangxi, China

²Business school, Xiamen Institute of Technology, Xiamen 361011, Fujian, China

^apim_lau@163.com, ^bliziyuan@xit.edu.cn

*Corresponding author

Abstract: The high-quality development of the digital economy can promote information symmetry, reduce transaction costs and improve labor productivity, provide a new platform for the development of enterprises, and also change the existing production methods and organizational models, improve economic efficiency, and accelerate economic growth. This paper takes the high-quality development (HQD) of the digital economy (dDE) in Jiangxi Province as the research direction, analyzes the impact of the new infrastructure on the development of the DE, and establishes three dimensions of the new infrastructure, namely information, transportation, energy and other infrastructures. Seven basic indicators are selected for the indicators. Obtaining these indicators through principal component analysis can explain the original digital economy data in Jiangxi Province. Comparing the digital economy growth quality index, it is found that to strengthen the quality development of Jiangxi's DE, it is necessary to strengthen the infrastructure construction of new infrastructure projects such as transportation and energy. In addition, this paper also analyzes the development of Jiangxi's DE from the perspective of the urban-rural income gap (URIG), and concludes that in order to achieve HQD of the DE, the construction of new infrastructure projects must be improved.

Keywords: New Infrastructure, Jiangxi Province, Digital Economy, High-quality Development

1. Introduction

The era of the DE has led to industry expansion and further increased investment, which means that the development of the DE also drives economic growth. In the process of integration with the traditional economy, digital products and corresponding services are applied to the development process of traditional industries. Traditional industries need to be upgraded and reinvested to increase the total social demand in economic development and inject new kinetic energy into economic growth. Therefore, the development of the DE has a positive effect on economic growth.

The research on the new infrastructure to help the HQD of the DE in Jiangxi Province has achieved good results. For example, a scholar believes that data, as a production factor in the DE era, is non-competitive, that is, the joint use of multiple subjects will create greater social value, and the non-competitive advantage will promote the increase in returns to scale of enterprises, and in the process of economic development accumulation of production plays a promoting role, and the combination with traditional production factors such as labor and capital will promote the sustainable growth of the digital economy [1, 2]. Some scholars have analyzed the development quality of Jiangxi's digital economy from three perspectives: microscopic, mesoscopic and macroscopic. Microscopically, they believe that the development of DE will improve the operation efficiency of small and medium-sized enterprises in Jiangxi; It is conducive to adjusting the industrial structure and further realizing the transformation of the industry; macroscopically, it is analyzed from two aspects. On the one hand, data, as the core production factor in the DE era, increases the source of factors of the traditional economy, and its unique advantages improve the efficiency of enterprises. On the other hand, technological innovation and diffusion can promote R & D investment and promote the HQD of Jiangxi's DE [3, 4]. Although the DE based on digital technology has developed rapidly, it has gradually become a research hotspot in academia. However, due to the short history of DE development in Jiangxi, the stability of DE development needs to be strengthened.

This paper explains the meaning of the DE, introduces the characteristics of the development of the

DE, and then analyzes the three dimensions of the new infrastructure capacity. The index calculates the contribution rate and weight, and obtains the DE growth quality index of Jiangxi Province in recent years, and compares the gap between the DE quality development in Jiangxi Province and the country.

2. Content Related to the Digital Economy

2.1. The Connotation of Digital Economy

Digital technology is a disruptive technology, and it is also a large-scale industrial investment of innovative power. Innovative digital technology can change both the supply side (SD) and the demand side [5]. From the perspective of the SD, technological change and progress can be promoted, and the technological elements in the production process will continue to increase. Innovation-driven economic development not only enables traditional production methods to break through development bottlenecks, but also transforms production and manufacturing models and organizational forms, and takes the lead in laying out production departments in new technologies and new industries, which can achieve higher production efficiency and investment than other organizations in the same industry. Less labor costs, a larger market share, and more obvious advantages of industrial planning and agglomeration. From the demand side, industrial transformation with digital economy and information technology as the main components can effectively accelerate industrial integration [6, 7].

The development of the DE is divided into three stages. The first stage is the development of the digital infrastructure, that is, the digitization of the information sector. The innovation and development of information technology has brought the economy into the digital age, laying the foundation for the development of the DE[8]; the first stage is the development of industrial digitalization, that is, the development of digital integration. Digitalization provides a new direction for economic development, especially for traditional industries; the third stage is digital transformation, that is, the stage of DE development. This stage includes both basic part of the development also includes the application of digitalization in the traditional economy. At present, the development of my country's DE is in the third stage. During this stage of development, the DE has shown the characteristics of being connected with the traditional economy but different from the traditional economy [9, 10].

2.2. Characteristics of Digital Economy Development

As a new form of economic development, the DE has derived many characteristics in the development process, the most important of which are as follows.

2.2.1. High Permeability

Due to the extremely rapid development of information and network technology and other brand-new technologies, and the extremely high penetration function of brand-new information technology and network technology, the software and information technology service industry is rapidly spreading to the primary and secondary industries. The three major industries have gradually shown a development trend of continuous deep integration and continuous mutual promotion, which makes the specific scope of the major industries no longer clear, and blurring the scope between various industries is the highly permeable function presented by the digital economy [11].

2.2.2. Network Effects

A network effect is a phenomenon in which a user's behavior affects the behavior of other users in the network. Information products are interrelated, and people have created the Internet in order to better collect information and communicate. Network effects are a key feature of many digital industries. On the one hand, companies use network effects to create value according to the needs of users. The more users who use them, the more value they create. On the other hand, it comes from the mutual cooperation between different categories, in order to consolidate the market position of enterprises [12].

2.2.3. Sustainability

Sustainable economic development has always been the development goal and requirement of the global economy. The specific approach is to combine economic development with the ecological environment, establish the concept of energy conservation and emission reduction, and jointly promote the coordinated development of resources, environment and social economy. The digital economy makes up for the shortcomings of the traditional economy in the development process, and achieves

goals that the traditional economy cannot achieve, such as excessive waste of resources, pollution of the environment, and ecological crisis in traditional industrial production. In the modern digital industry these problems have been well dealt with, and at the same time, the sustainable development of economy and society has been promoted.

2.2.4. Decreasing Marginal Cost

The main sources of costs in the development of the DE are network construction and the mutual transfer of information, and these costs will not increase with the increase in the scale of users. Due to the characteristics of reproducibility, in the long run, the marginal cost is very small. At the same time, the development of the DE has the characteristics of cumulative value-added, and the characteristics of increasing marginal benefits are reflected.

2.3. Contents of New Infrastructure Capacity Indicators

The definition of the variable content of new infrastructure should not only take into account the "new" characteristics of new infrastructure, but also the availability of relevant indicators in empirical research. The research on infrastructure related to new infrastructure mainly focuses on information, transportation, energy, telecommunications, etc., while the research on telecommunications infrastructure and information infrastructure construction capabilities, some scholars use similar measurement indicators, so in the sub-indices to When researching new infrastructure, telecommunications infrastructure and information infrastructure are combined into one dimension. The new infrastructure capabilities mainly include three levels of transportation, information and energy. The information infrastructure construction capability mainly refers to the information infrastructure with the Internet as the core, including big data, artificial intelligence, industrial Internet, etc.; the transportation infrastructure construction capability mainly refers to the transportation infrastructure with urban rail as the core; the energy infrastructure construction capability mainly refers to It is an energy infrastructure with electricity as the core, including new energy vehicles, new fuels, etc.

2.4. Assessment of Digital Economy Development Capabilities

The Theil index, GDP per capita, and urban-rural income ratio will be used to measure the distribution of economic welfare, and the Theil index will be introduced to measure the URIG between Jiangxi and the country. The Theil index is mainly used to measure the rationality of economic distribution, and the Theil index is proportional to income inequality between UR areas. In this paper, the income difference between UR areas is used to represent the de-economic welfare distribution factor (REGD), and the Theil index is used to measure:

$$REGD_j = \sum_{i=1}^2 \left[\left(\frac{A_{ij}}{A_j} \right) \ln \left(\frac{A_{ij}/A_j}{B_{ij}/B_j} \right) \right], i=1,2 \quad (1)$$

Among them, $REDG_j$ represents the Theil index of the URIG in the j period; i represents the region (1 represents the countryside, 2 represents the city); B_j represents the total population(TP) size in the j period (ten thousand people); B_{ij} represents the TP size in the j period in the i region; A_j represents the total income in period j; A_{ij} represents the income in period j in region i.

$$GDP_p = \frac{GDP_A}{sum_p} \quad (2)$$

Among them, GDP_p is GDP per capita, GDP_A is total GDP, and sum_p is total population.

3. Experimental Research

3.1. Select the Evaluation Indicators for the Quality of Digital Economic Growth

To achieve high-quality digital economic growth from the perspective of new infrastructure, it is necessary to analyze economic indicators from the three dimensions of information infrastructure,

transportation infrastructure, and energy infrastructure of new infrastructure capabilities. Seven indicators including AI technology and industrial IoT technology; urban rail transit and high-speed railway in the transportation dimension; new energy vehicles and new fuels in the energy dimension are used to measure the quality of DE growth in the development of Jiangxi's digital economy.

3.2. Research Methods

In the process of measuring the quality of DE growth, for the three-dimensional indicators, factor analysis can obtain the trend of changes in public factors, but cannot accurately obtain the specific changes in these three dimensions. The use of principal component analysis method to assign weights to each basic index in each dimension index system is determined by the comprehensive evaluation of each basic index and each dimension index by principal component (PC) analysis method. The PC analysis method can determine the specific contribution of each dimension to the economic growth quality index. Due to this advantage, this paper uses the PC analysis method to determine each dimension to synthesize the weight of the dimension indicators, and then uses the same method to synthesize the DE growth quality index to concretize and digitize the DE growth quality, so that we can specifically measure and compare.

4. Analysis of Research Results

4.1 Calculation of Contribution Rate of New Infrastructure Indicators

There are two PC of the index dimension determined in this paper. The cumulative variance contribution rate(CVCR) of the three dimensions of the new infrastructure calculated by this method is shown in Table 1. The CVCR of the first two PC of information infrastructure is 92.318, the CVCR of the first two PC of transportation infrastructure is 99.924, and the CVCR of the first two PC of energy infrastructure is 94.672, are more than 80%, indicating that the interpretation ability of the original data is very strong and effective.

Table 1: Calculation results of dimension index contribution rate

dimension	Element	characteristic root	Variance contribution rate (%)	Cumulative variance contribution rate (%)
information infrastructure	1	4.328	81.263	81.263
	2	0.856	12.547	92.318
Transport infrastructure	1	2.473	80.652	80.652
	2	0.295	11.245	89.346
energy infrastructure	1	1.906	77.408	77.408
	2	0.891	21.622	94.745

Table 2: Calculation results of dimension basic index weights

Dimensional Metrics	basic indicators	Basic indicator weight
information infrastructure	big data technology	0.445
	artificial intelligence technology	0.562
	Industrial IoT Technology	0.479
Transport infrastructure	Urban rail transit	0.628
	high speed railway	0.342
energy infrastructure	new energy vehicles	0.455
	new fuel	0.534

The weights of the basic indicators of the new infrastructure are obtained through calculation, as shown in Table 2. The weights of three basic indicators of information infrastructure: the weight of big data technology is 0.445, the weight of artificial intelligence technology is 0.562, and the weight of industrial Internet of Things technology is 0.479; the weight of two basic indicators of transportation infrastructure: the weight of urban rail transit is 0.628, the weight of high-speed railway is 0.342; the weight of two basic indicators of energy infrastructure: the weight of new energy vehicles is 0.455, and the weight of new fuel is 0.534.

According to the weights of basic indicators in Table 1 and Table 2 and their corresponding weights, the time series of the three new infrastructure dimension indices can be calculated, and then combined with the weights of each dimension index, the digital economy growth quality index of Jiangxi can be

calculated. The digital economy growth quality index, the results are shown in Figure 1.

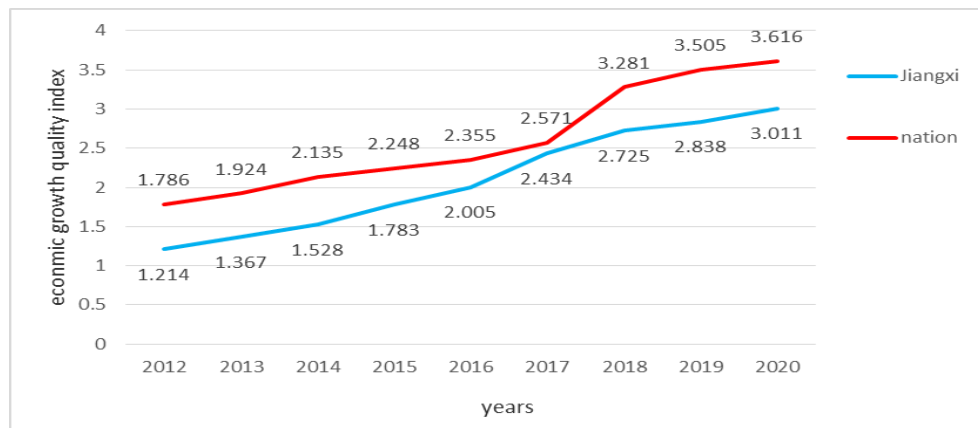


Figure 1: Comparison of Jiangxi and National Digital Economy Growth Quality Index

As shown in Figure 1, the comparison of the digital economic growth quality of Jiangxi and the country from 2012 to 2020 is calculated. The data shows that the quality of their digital economic growth is on the rise, both in Jiangxi Province and the country as a whole. During the period from 2012 to 2020, the digital economic growth index of Jiangxi Province rose from 1.214 to 3.011, and the country's digital economic growth index rose from 1.786 to 3.616. Between 2016 and 2017, the growth rate of Jiangxi's digital economy growth quality index was greater than the country's digital economy growth rate. This is because Jiangxi's economic and social development has been more comprehensive this year, which has led to the continuous improvement of the quality of DE growth. However, in the future development of the DE, attention should be paid to the development of low indicators such as high-speed railways and new energy vehicles. In addition, various dimensional indicators reflect that there is a certain correlation in the quality of DE growth, reflecting the quantitative characteristics of the same internal quality and external quantity in the process of DE growth quality. The development of new infrastructure affects the quality of DE growth in Jiangxi and even the country. According to the observed values of impact factors, it affects the quality of digital economic growth in Jiangxi to varying degrees and in different directions. It can be seen from the above analysis conclusions that to achieve the quality of DE growth requires further strengthening of the construction of new energy facilities for high-speed railways.

4.2 The HQD Path of Jiangxi's DE - Narrowing the Gap between Urban and Rural Areas

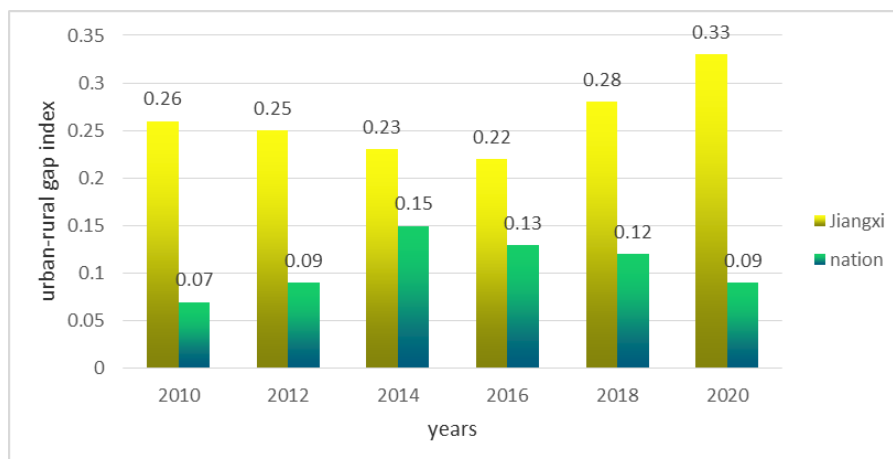


Figure 2: Comparison of the urban-rural income gap index between Jiangxi and the country

Another important indicator of the HQD of the DE is the URIG. This paper measures the distribution of economic welfare by the urban-rural difference, and will introduce the Theil index to measure the URIG between Jiangxi and the country. The Theil index is mainly used to measure the rationality of economic distribution, and the Theil index is proportional to income inequality between urban and rural areas. Jiangxi's Theil index is in a trend of rising volatility, as shown in Figure 2 is the URIG index between Jiangxi and the country. It dropped from 0.26 in 2010 to 0.22 in 2016, and then

rose to 0.33 in 2020. The country's urban-rural income gap rose from 0.07 in 2010 to 0.15 in 2014, and then decreased to 0.09 in 2020. It can be seen from this that the gap between UR areas in Jiangxi is getting wider and wider. On the contrary, the gap between UR areas in the country has indeed declined in the past ten years. From the perspective of the quality of DE growth, the increase in the gap between UR areas is not in line with the quality of DE growth. Therefore, in order to improve the quality growth of the DE in Jiangxi, the income gap between UR areas must be narrowed, so that the quality of DE growth in Jiangxi can be improved. Narrowing the URIG should not only increase the income of low-income groups, but also allow the government to improve infrastructure capabilities and strengthen the construction of new infrastructure projects.

5. Conclusion

The DE has become an important structure for the HQD of my country's economy, which can better promote balanced, full and coordinated economic development. This paper takes the development of the DE in Jiangxi Province as an example to study the role of new infrastructure projects in promoting the development of the DE in Jiangxi Province. The experimental research shows that all dimensions of the new infrastructure projects affect the development of the DE. To achieve HQD of DE, it is necessary to It can start from the construction of new infrastructure.

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