

Research on the Impact of Digital Circulation on the Integration of Rural Three Industries

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Abstract. The digital economy is a new driving force for the development of various industries today, and digital circulation, as an important part of the digital economy, promotes the process of rural modernization by promoting industrial integration in rural areas. Based on the provincial panel data from 2013 to 2020, this paper constructs the index system of digital circulation and the integration of three industries in rural areas respectively, uses the entropy method to comprehensively evaluate the level of digital circulation and the integration of three industries, and analyzes the impact relationship between them through regression model. The results indicate that digital circulation can have a positive impact on industrial integration in rural areas through the digital upgrading of circulation facilities, the digitization of circulation channels, and the level of digital finance. Therefore, in order to promote the integration of rural industries and promote rural modernization, it is necessary to actively carry out digital upgrading of infrastructure, strengthen the digital transformation of circulation channels, and expand the depth and breadth of digital financial coverage.

Keywords: digitalization of circulation; Integration of rural three industries; Rural modernization

1 Introduction

Promoting the comprehensive benefits and development level of rural areas is a key goal of China's agriculture, rural areas, and farmers issues. The development experience of developed countries shows that the integration of the three industries in rural areas is of great significance for achieving rural modernization. The combination of agriculture and industry has improved the production efficiency of agriculture and enhanced the driving force of major industries in rural areas for economic development; The combination of agriculture and service industry has led to the emergence of sightseeing agriculture and experiential agriculture, creating new economic growth points for rural areas; In the process of industrial integration, agriculture also extends its own industrial chain and improves overall economic efficiency. However, there are still many issues facing the integration of the three industries in rural areas, such as the low level of integration, the need to improve the length of the industrial chain, and the weak level of infrastructure that hinders industrial integration. At present, the digital economy is developing rapidly, and the role of digital innovation applications in rural industrial integration is becoming increasingly significant. However, the research field on the impact of digitalization in the circulation industry on rural industrial integration is still not rich. Given this situation, this article will focus on the impact of digitalization in circulation on rural industrial integration.

2 Research Design

2.1 Variable design

Explanatory variable: level of integration of rural three industries (IA)

The integration of rural three industries refers to the formation of new business models to extend the industrial chain and enhance the economic development vitality of rural areas by integrating other industries on the basis of agriculture. Therefore, it is necessary to establish a comprehensive evaluation system to evaluate the level of integration of the three industries. From the three aspects of agricultural industry chain extension(AC), agricultural and industrial integration(AII), and agricultural and service industry integration(AS), five secondary indicators are selected to construct an evaluation system: the proportion of agricultural product processing industry(PAP), the number of farmers' professional cooperatives(NF), the proportion of leisure agriculture(PI), the proportion of facility agriculture(PF), and the proportion of agricultural, forestry, animal husbandry, and sideline fishing service industry (PS).^[1]The indicators are shown in Table 1. Calculate the indicator weight using the entropy method, and then calculate the level of integration of rural three industries (IA) in 30 provinces as the dependent variable.

Table 1. Evaluation Index System for the Development Level of Rural Integration of Three Industries

Primary indicators	Secondary indicators	weight
AC	PAP	0.22
	NF	0.17
AII	PF	0.22
AS	PI	0.2
	PS	0.19

Core explanatory variable: Circulation Digitalization Level (CDI)

Circulation digitization level is mainly measured from three aspects: infrastructure digitization^[2], circulation channel digitization and digital financial level. The index of infrastructure digitization selects Internet popularity and the number of Internet access ports as secondary indexes. E-commerce development index, express business volume, the proportion of added value of circulation industry in GDP and the proportion of e-commerce in GDP are selected as the second-level indicators for the digitalization of circulation channels, and the coverage depth and coverage breadth of digital finance^[3] are selected as the second-level indicators for the level of digital finance. The specific indicators and weights calculated by entropy method are shown in Table 2.

Table 2. Digital circulation level evaluation index system

First-order index	Secondary index	weight
Digitization of infrastructure	Internet popularity	0.11
	Number of Internet access ports	0.12

Circulation channel digitization	E-commerce development index	0.16
	Express business volume	0.17
	Ratio of value added of circulation industry to GDP	0.10
	Proportion of e-commerce in GDP	0.12
Digital finance level	Depth of digital finance coverage	0.11
	Coverage of digital finance	0.11

Control variables

In order to exclude the influence of other possible factors on the integration level of three industries in rural areas, GDP and rural infrastructure(RI) are selected as control variables in this paper. Among them, rural infrastructure is a comprehensive evaluation index of multiple indexes, and the specific indexes and weights are shown in Table 3.

Table 3. Evaluation index system of rural infrastructure level

First-order index	Basic description	weight
Farmland water conservancy	Effective irrigated area	0.14
Energy supply	Rural electricity consumption	0.18
Traffic and transportation	Graded highway mileage	0.13
Rural education	Length of education for rural labor force	0.11
Agricultural science and technology	Funds for agricultural science and technology activities	0.16
Information network	Telephone number per 100 rural households	0.13
Sanitary environment	Number of village clinics	0.15

2.2 Model construction

$$IA_{it} = \alpha_0 + \alpha_1 CDI_{it} + \alpha_2 control_{it} + \varepsilon_{it}$$

In the above formula, i represents the provincial region and t represents the year. IA_{it} is the dependent variable representing the integration of rural three industries, CDI_{it} is an independent variable representing the level of digital circulation, $control_{it}$ is control variables, including GDP, agricultural technology investment, and rural electricity consumption, ε_{it} is a random interference term.

2.3 data sources

The data mainly comes from the corresponding year's "China E-commerce Development Index Report", "China Statistical Yearbook", "China Rural Statistical Yearbook", "China Industrial Statistical Yearbook", and statistical yearbooks of various provinces (autonomous regions, municipalities directly under the central government). The descriptive statistics of each variable are shown in Table 4.

Table 4. Descriptive statistics

VARIABLES	mean	sd	min	max
CDI	0.261	0.122	0.0716	0.742
IA	0.163	0.0999	0.0232	0.512
RI	95.01	85.71	7.977	400.5
gdp	26,745	21,597	1,713	111,152

2.4 Results of basic regression

The OLS regression results are shown in Table 5. the digital circulation coefficient is positive, and the 10% significance test verifies the hypothesis that the improvement of digital circulation level can effectively promote the integration of rural industries. It can be shown that in the development process of the Internet and e-commerce, the rural circulation system represented by the supply chain of agricultural products, express logistics, consumer goods sales, etc., is also constantly improving, so that the industrial integration in rural areas provides a long-term and sustainable power. As one of the driving forces for the expansion of circulation channels, the development of digital finance also provides a good foundation for the integration of rural three industries. The digital improvement of circulation also promotes the commodity circulation between rural and urban areas to a certain extent, and promotes the vertical integration of rural industries.

Table 5. OLS regression results

IA	Coef.	St.Err.	t-value	p-value	[95%Conf Interval]	Sig
CDI	0.127	0.074	1.72	0.087	-0.018	0.273 **
NCJJSC	0.09	0.058	1.56	0.12	-0.023	0.205
GDP	-0.113	0.076	-1.49	0.138	-0.264	0.036
Constant	0.135	0.016	8.4	0	0.301	0.167 ***
*** p<0.01, ** p<0.05, * p<0.1						

3 Conclusion and policy suggestions

The empirical results indicate that improving the level of digital circulation contributes to the integration and development of rural industries. Therefore, this article proposes the following suggestions based on empirical analysis data :

First, we will promote the digital upgrading of infrastructure in rural areas. Modern circulation infrastructure construction is a bridge connecting rural agricultural production and market demand, and is an important foundation of rural industrial integration.^[4] Therefore, rural infrastructure should be upgraded first, including the depth and breadth of Internet coverage, extending the length and quality of road traffic, etc. Secondly, accelerate the digital construction of circulation channels, promote the application of digital technologies in rural areas, push big data and other digital technologies to be applied in the production, transportation and circulation of agricultural products, and build a trading platform for agricultural products. Finally, vigorously promote the development of digital finance to provide financial support for the integration of rural industries.^[5] Digital financial platforms will be set up for remote and poor

areas, urban commercial capital will be introduced to rural areas, and funds will be allocated to the main operators of the industrial chain.

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