[1] Hui Yang
[2,*] Yu Duan

Research on the Influence of Digital Economy on the Development of Rural E-Commerce

JES Journal of Electrical Systems

Abstract: - This paper uses the provincial panel data from 2013 to 2020 to empirically investigate the influence and occurrence mechanism of digital economy on rural e-commerce. Finally, it is concluded that: (1) digital economy plays a significant role in promoting the development of rural e-commerce, and the eastern part of China is stronger than the central and western regions; (2) the digital economy infrastructure, digital economy application level and innovation level of digital economy of the three dimensions of digital economy development index system have the strongest influence; (3) Industrial structure upgrading and rationalization are the indirect way that digital economy affects the development of rural e-commerce. Therefore, we should vigorously build infrastructure in rural and remote areas, formulate rural e-commerce development policies according to local conditions, create a more reasonable and advanced industrial structure, and lay a good foundation for the digital economy to fully promote the development of rural e-commerce.

Keywords: Digital economy, rural e-commerce, influence mechanism, regional heterogeneity.

I. INTRODUCTION

In May 2019, the State issued the Outline of the Digital Rural Development Strategy, which clearly stated the strategic goals of the digital rural development in China. As a crucial part of the digital countryside, the development of rural e-commerce cannot be separated from the digital economy. With the gradual development and maturity of various Internet technologies and the rapid rise of digital economy, information and data are an important support for economic development in the new era, which will play a significant role in the rise of rural e-commerce.

The marginal contribution of this paper mainly has the following four points:

First, many documents only talk about the impact of digital economy on the development of rural e-commerce at the theoretical level, lacking empirical test. This paper conducts empirical research and deeply reveals the effect of digital economy on the development of rural e-commerce.

Second, the explained variable in this paper is the development level of rural e-commerce. There is no unified standard and definition of this variable in the academic circle, such as Zhan Jing Using the number of Taobao villages to measure the development level of rural e-commerce, Yang Ying et al. Infrastructure construction, the development potential of e-commerce, financial support and government market supervision are selected as the first-level index to construct the index system. On the basis of the existing research in this paper, a new set of index system is established to measure the explained variables.

Third, there are few studies on the influence of the transmission mechanism of digital economy on the development of rural e-commerce, and the upgrading of rural industrial structure is closely related to the development of rural e-commerce[7-8]. On this basis, this paper takes industrial structure upgrading as an intermediary variable, and reveals the transmission mechanism of digital economy to the development of rural e-commerce.

[1] Hui Yang, Affiliation: Chinese Academy of Social Sciences. Email: yanghui481207@163.com

[2,*] Corresponding author: Yu Duan, Affiliation: School of Economics and Management of Beijing Information Technology University. Email: Tongji_duanyu@163.com.

II. LITERATURE REVIEW, THEORETICAL ANALYSIS AND RESEARCH HYPOTHESIS

Digital economy plays a supporting role in the smooth flow of the national economy, and digital economy is also an important guarantee for the rational allocation of all kinds of social resources in China. As an emerging business model, rural e-commerce has changed the mode of rural economic development [1], Has an indispensable role in China's economic development, so it is necessary to explore how the digital economy acts on rural e-commerce.

A. The direct impact of digital economy on rural e-commerce

Improving the level of digital economy can provide greater, market and advanced technology for the development of rural e-commerce, and the huge potential existing in the development of rural e-commerce can be tapped [10]. In the past two years, the state has introduced a number of measures around rural e-commerce[5], Many of their own brands were created by the government[2]. The government should actively improve the three-level e-commerce service system at county, township and village levels, be able to integrate rural e-commerce resources with "Internet +", actively establish county-level e-commerce operation service center, and the government should formulate more appropriate policies and improve the transaction mechanism [3], From the perspective of external incentive, encourage public participation, establish corresponding incentive measures, and strengthen the construction of demonstration villages[4]. Therefore, this paper proposes hypothesis 1:

H_1: Digital economy plays a direct role in promoting the development of rural e-commerce.

1) The indirect impact of digital economy on rural e-commerce: In addition to the direct impact, the digital economy also has an indirect impact on rural e-commerce. Research shows that the upgrading of the industrial structure has promoted the regional economic development [6, 14], At the same time, the continuous upgrading of the industrial structure comes from the digital economy, so the efficient sector will absorb more and more resources, while the inefficient sector will lose more and more resources [1, 13], Industrial structure is more advanced and reasonable. Therefore, this paper proposes hypothesis 2:

H_2: In addition to having a direct impact on the development of rural e-commerce, digital economy can also promote the development of rural e-commerce by improving the upgrading and rationalization of industrial structure.

2) The heterogeneity of digital economy to rural e-commerce: The digital economy has a "crowding out effect", leading to lower relative incomes for low-and low-skilled workers and potentially higher unemployment. The development of digital economy crosses the threshold of scale and aggravates the income gap between urban and rural areas. Therefore, it can be seen that the development of digital economy has different effects and heterogeneity. Therefore, this paper puts forward hypothesis 3:

H_3: For different regions, the effect of digital economy on the development of rural e-commerce is heterogeneous.

III. EMPIRICAL ANALYSIS

A. Variable selection and data description

1) explained variables: The variable in this paper is the development level of rural e-commerce. From the analysis of industry development, infrastructure and industrial benefits, the entropy right method is used to calculate the index of rural e-commerce development level. The specific indicators are shown in Table 1:

Table 1 Measurement index system of provincial rural e-commerce development

The standard layer	weight	Index layer	weight	effect
Industry development (indus _ deve)	0.19	Proportion of e-commerce transactions (proe _ commtran)	0.09	+
	0.17	Mobile Internet users (mobi _ nteruser)	0.08	+
	0.64	Express delivery volume (express_volume)	0.31	+
Infrastructure (infras)	0.70	Internet penetration rate (interrate)	0.05	+

	0.30	Smart phone ownership per 100 rural households (permoblie)	0.02	+
	0.21	Ratio of e-commerce transaction volume to total social consumer goods (rate)	0.10	+
Industrial benefits (indus _ bane)	0.14	Per capita resident disposable income (perincome)	0.06	+
	0.65	Total postal service volume (total_postal_business)	0.29	+

Note: Efficacy indicates the nature of the index, "+" indicates the positive index, and "-" represents the reverse index; the latter table is the same.

2) Core explanatory variables: This paper constructed the digital economy, digital economy application and digital economy innovation three level 1 dimension and 16 secondary dimension digital economy development measurement index system (see table 2), and based on the entropy panel data method get digital economy, development index (deco) and digital economy (dbas), digital economy application (app) and digital economy innovation (dcre) three classification index, specific evaluation index see Table 3:

Table 2 Measurement index system of the development level of provincial digital economy

The standard layer	weight	Index layer	weight	effect
Digital Economy infrastructure (dbas)	0.15	Number of Internet broadband ports	0.04	+
	0.13	Number of mobile phone households	0.03	+
	0.22	Number of fixed phone calls	0.05	+
	0.31	Telecom business volume	0.07	+
	0.19	Highway mileage per capita	0.05	+
	0.19	The number of companies with e-commerce transactions	0.06	+
Digital economy application level (dapp)	0.40	Express revenue	0.13	+
	0.17	Number of enterprise websites	0.05	+
	0.06	per capita GDP	0.02	+
	0.18	Urban-rural development gap	0.06	+
Innovation level of the digital economy (dcre)	0.18	R & D personnel full-time equivalent	0.08	+
	0.17	R&D funds	0.07	+
	0.20	Patent authorization	0.09	+
	0.27	Technology market turnover	0.11	+
	0.18	Sales revenue from new products	0.08	+

3) Control variables: In this article, please refer to Chen Chong and Zhang Ruijin [5, 12]. The ideas and principles of selecting control variables, select the following control variables: the living standard (outc), expressed by the per capita consumption expenditure of rural residents; the industrial development level (threp), the proportion of tertiary industry; the infrastructure (len), the length of rural delivery line in the total length; the financial development level (fair) and the ratio of the deposit amount of Chinese financial institutions and the loan amount of Chinese financial institutions.

IV. INTERMEDIARY VARIABLES

The intermediary variable of this paper is the upgrading of industrial structure. According to Feng Suling and Xu Dehui[9,11]. The advancement of industrial structure (Indh) refers to the evolution process of industrial structure

from a lower level to a higher level; the rationalization of industrial structure (Indr) refers to the construction, connection and integration of production factors among industries. The rationalization of industrial structure cannot be separated from the digital economy, which provides a solid foundation for the rationality of industrial structure, and then promotes regional coordinated development.

V. DATA DESCRIPTION

In this paper, the dynamic panel data from 31 provinces from 2013 to 2020 are selected. The data are obtained from the statistical Yearbook of each province, National Bureau of Statistics, Wind database and China Statistical Yearbook. In the empirical analysis, the control variables are treated logarithmically to eliminate the impact of different dimensions of variable data.

Table 3 Description statistical results of the main variables

variable classes	Variable name	symbol	sample capacity	mean	standard deviation	least value	crest value
explained variable	Overall index of rural e-commerce development	rural_ecommerce	248	12.384	10.831	1.437	80.832
	Industry development level	indus_deve	248	9.272	10.676	0.499	80.607
	Infrastructure level	infras	248	44.559	17.527	7.429	89.390
	Industrial benefit level	indus_ bene	248	10.258	10.932	0.938	80.254
explanatory variable	The Digital Economy Development General Index	deco	248	12.812	12.128	1.72	79.48
	Digital economy infrastructure	dbas	248	15.555	9.889	2.83	67.92
	Application level of digital economy	dapp	248	12.294	12.448	1.83	77.88
	Innovation level of the digital economy	dcre	248	11.659	14.880	0.002	87.18
metavariable	Rationalized the industrial structure	lndr	248	2.559	0.803	1.76	6.41
	Advanced industrial structure	lndh	248	2.672	0.533	2.44	5.39
controlled variable	Per capita consumption expenditure of rural residents	lnoutc	248	9.299	0.404	8.32	10.73
	The proportion of tertiary industry	lnthrep	248	3.876	0.172	3.47	4.43
	The length of rural delivery routes is medium-sized in the	lnlen	248	11.462	0.858	8.57	12.66

	total length of postal routes						
	Financial level development index	lnfir	248	1.210	0.282	0.64	1.97

A. Model construction

1) Benchmark regression model: To explore the direct impact of digital economy on rural e-commerce, establish the following benchmark regression model:

$$tbnum_{it} = \alpha_0 + \alpha_1 deco_{it} + \beta_2 deco_{it}^{\ 2} + \gamma_j Z_{it} + \mu_i + \theta_t + \varepsilon_{it} \textbf{(1)}$$

Formula (1), i represents the i province, t said t years, tbnum for rural electricity development level, deco means digital economy development level, Z represents control variables, secondary introduction of digital economy development variables, because the influence of digital economy development on rural electricity may be nonlinear, β, γ for explanatory variables and control variables, μ, θ, ε respectively said province fixed effect, time fixed effect and random disturbance.

2) Mechanism test model: According to the above analysis, there may be indirect effects on the principle of digital economy, and the mediation effect model is set as follows:

$$lndh_{it} = \alpha_0 + \alpha_1 deco_{it} + \gamma_j Z_{it} + \mu_i + \theta_t + \varepsilon_{it} \textbf{(2)}$$

$$lndr_{it} = \beta_0 + \beta_1 deco_{it} + \gamma_j Z_{it} + \mu_i + \theta_t + \varepsilon_{it} \textbf{(3)}$$

$$tbnum = \alpha_0 + \theta_1 deco_{it} + \theta_2\, ln\, d\, h_{it} + \theta_4\, ln\, d\, r_{it} + \gamma_j Z_{it} + \mu_i + \theta_t + \varepsilon_{it} \textbf{(4)}$$

In Equation (4), l nd h represents the advanced industrial structure, l ndr indicates the rationalization of the industrial structure, and the meaning of other parameters and variables is consistent with those introduced in Equation (1).

3) Benchmark regression: Column (1) ~ (4) is the regression result of unadded control variables and fixed effects, indicating the direct effect of the development of digital economy on the development of rural e-commerce. The regression coefficients are 0,0,0 and 0 respectively, and all have passed the significance level test of 1%, that is, digital economy has a significant role in promoting the development of rural e-commerce. Column (5) ~ (8) are the results of adding control variables and fixed effects of time and region, and the regression coefficients are 0,0,1 and 0, respectively. From the size of the regression coefficient, for every 1% increase in the development level of the digital economy, the rural e-commerce increased by 0.597%. From the results, the benchmark regression results verify the research hypothesis 1 that digital economy can significantly promote the development of rural e-commerce. 779.794.812.757.597.674.104.639.

Table 4 Benchmark regression results

variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	re	indus_deve	infras	indus_bene	re	indus_deve	infras	indus_bene
deco	0.779***	0.794***	0.812***	0.757***	0.597***	0.674***	1.104***	0.639***
	(0.028)	(0.024)	(0.076)	(0.031)	(0.160)	(0.184)	(0.176)	(0.1698)
deco 2					0.0054***	0.0056***	0.0037**	0.0062***
					(0.0015)	(0.0017)	(0.0026)	(0.00159)
lnoutc					-6.277	-4.417	9.174***	-14.176***
					(3.676)	(4.234)	(2.321)	(3.902)
lnthrep					-2.410	0.152	-5.183	-4.552
					(3.658)	(4.214)	(6.073)	(3.88)
lnlen					0.900	0.704	9.9121***	1.3537
					(0.945)	(1.088)	(1.085)	(1.0027)

lnfir					0.319	0.423	7.668**	-0.2864
					(2.229)	(2.568)	(3.033)	(2.366)
The intercept term	2.408***	-0.897**	34.155	0.560	60.083	30.828	70.965	134.433***
	(0.491)	(0.428)	(1.343)	(0.550)	(39.015)	(44.94)	(33.982)	(41.41)
Regional effect	deny	deny	deny	deny	yes	yes	yes	yes
time effect	deny	deny	deny	deny	yes	yes	yes	yes
sample capacity	248	248	248	248	248	248	248	248
R 2	0.7602	0.8130	0.9217	0.7051	0.9583	0.9431	0.7263	0.9539

Note: * * *, * * and * are significant at the 1%, 5% and 10% levels, respectively. Re is the rural e-commerce development index is abbreviated, the following table is the same.

4) Mechanism analysis: Column (1) and (2) are the results of lndr and lndh, with coefficients 035 and 0.0124 respectively, which are significant at 5%, that is, digital economy has significant positive influence on advancement and rationalization of industrial structure, and columns (3) and (4) are the results of influence of advanced industrial structure and rationalization of industrial structure on the development level of rural e-commerce. Industrial structure advanced by 1%, the rural electricity development level by 1.1154%, rationalization of industrial structure by 1%, rural electricity development level by 1.08%, and both through the Sobel test and Bootstrap test, the confidence interval does not contain 0, and P value is small enough, shows that there is intermediary effect, and the total effect of industrial structure advanced mediation effect accounted for 51.9%, the rationalization of industrial structure accounted for 86.5% of the total effect. First (5) to the first (10) is, advanced industrial structure and industrial structure rationalization respectively the influence of industry development, infrastructure and industry benefit, not only a significant promoting effect, and the intermediary effect of 51.5%, 86.6%, 78.4%, 90.8%, 53.9%, 56.1%, the mechanism test results verified hypothesis 2, digital economy in addition to have a direct impact on rural electricity development, also can improve the industrial structure and rationalization to promote the development of rural electricity.

Table 5 Transmission mechanism of industrial structure upgrading

variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	lndh	lndr	re	re	indus_deve	indus_deve	infras	infras	indus_bene	indus_bene
deco	0.00035***	0.0124**	1.1154***	1.08***	1.21***	1.17***	0.79***	0.177***	1.24***	1.21***
	(0.0001)	(0.00516)	(0.1216)	(0.117)	(0.135)	(0.128)	(0.08)	(0.06)	(0.13)	(0.134)
lndh			72.63		80.18		30.05		74.44	
			(42.90)		(47.49)		(27.75)		(46.88)	
lndr				4.54		5.47		-0.725		4.44
				(3.95)		(4.42)		(1.44)		(4.13)

lnoutc	-0.0137 (0.0183)	-0.119 (0.427)	-5.671 (5.493)	-6.17 (4.98)	-3.72 (6.19)	-4.23 (5.52)	11.1*** (2.18)	28.51*** (5.34)	-13.6** (6.35)	-14.14** (5.88)
lnthrep	0.10126*** (0.0158)	0.3029 (0.4331)	-13.026 (8.299)	-6.93 (5.57)	-11.35 (9.01)	-4.74 (6.44)	-2.80 (6.88)	-5.43 (6.46)	-15.83 (9.38)	-9.52 (6.09)
lnlen	-0.0127** (0.0037)	-0.0717 (0.0840)	1.9724 (1.217)	1.47 (1.08)	1.87 (1.26)	1.36 (1.15)	-8.1*** (1.04)	-0.614 (1.25)	2.48* (1.37)	1.96 (1.23)
lnfir	-0.011 (0.0046)	-0.2643 (0.2737)	3.1966 (2.177)	3.76 (3.167)	3.45 (2.13)	4.19 (3.20)	8.27*** (3.16)	2.84 (2.47)	2.94 (2.77)	3.47 (3.80)
The intercept term	0.8267** (0.1841)	4.080 (4.850)	6.529 (66.739)	48.12** (54.64)	-33.89 (83.23)	10.19 (66.50)	-1.34 (27.53)	166.4*** (51.64)	81.61 (70.23)	125.11* (61.12)
area	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
time	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
sample capacity	248	248	248	248	248	248	248	248	248	248
R^2	0.9759	0.9625	0.9576	0.9595	0.9426	0.9459	0.9894	0.9894	0.9525	0.9541
Sobel			2.260** (0.024)	9.265*** (0.000)	2.258** (0.024)	9.235*** (0.000)	-2.02** (0.043)	6.974*** (0.000)	2.261** (0.024)	3.515*** (0.000)
Bootstrap-Test			5.36*** [64.27, 138.46]	5.23*** [3.69, 8.11]	5.26*** [66.62, 145.76]	5.16*** [3.80, 8.46]	5.46*** [70.14, 148.61]	6.59*** [4.73, 8.75]	4.98*** [57.52, 132.17]	4.72*** [3.22, 7.79]
Mediator effect ratio			0.519	0.865	0.515	0.866	0.784	0.908	0.539	0.561

*5) **Robustness test:*** Table 6 columns (1) ~ (2) shows that the two stages of digital economy have significant positive effects on rural e-commerce, And the second stage has a greater effect than the first stage, But there is very little difference, The promoting effect of the digital economy is robust; The municipal digital economy will develop faster than that in other provinces, Therefore, this paper deleted 4 municipalities and then conducted regression analysis, Results are shown in the column (3), The results remained significant after removing municipalities, And the promotion effect becomes larger, Because the municipality itself has a very strong level

of development, So the promotion effect of municipalities is smaller than that of other provinces, After removing the municipality directly under the Central government, it shows the strong promoting effect of other provinces; The level of digital economy development measurement is not unique, This paper replaces the core explanatory variable with the Peking University, Results are shown in the column (4), Replacing the core explanatory variables with the financial inclusion index still plays a significant role in promoting the development of rural e-commerce, Robustness; Using L1.Dig ln (Per) as the exogenous variable, The established GMM results are shown in the column (5). The estimated coefficient of digital economic variables was still significantly positive, and AR (2), Sargan test and Hansen test values all passed the stability test, indicating that the benchmark regression results are reliable.

Table 6 The robustness test

	(1)	(2)	(3)	(4)	(5)
deco	0.82*** (0.000)	1.07*** (0.000)	1.24*** (0).055	0.246*** (0).038	0.13** (0.061)
The intercept term	4.98 (6.11)	25.72 (0.05)	18.54*** (5).84	-41.11*** (11.63)	-0.47 (0.69)
controlled variable	yes	yes	yes	yes	yes
Regional effect	yes	yes	yes	yes	yes
time effect	yes	yes	yes	yes	yes
sample capacity	93	155	216	248	217
R^2	0.9880	0.9814	0.9673	0.9129	0.8954
AR(2)					-1.76** (0.078)
Sargan-Test					126.48*** (0.000)
Hansen-Test					20.36* (0.01)

6) Heterogeneity analysis: To explore the two areas of digital economy influence on rural electricity development whether there are significant differences, the selected area is divided into eastern and Midwest two regional analysis respectively, the results as shown in table 7, the eastern region and the Midwest of digital economy are significantly positive driving the development of rural electricity, and high red, ling-ling xu and party zhiqin Conclusions [10].

Table 7 Results of the regional heterogeneity regression

	(1) east	(2) Midwest
deco	1.00*** (0.000)	0.63*** (0.000)
The intercept term	-232.23 (173.16)	9.34 (0.682)
controlled variable	yes	yes
Regional effect	yes	yes
time effect	yes	yes
sample capacity	80	168
R^2	0.9427	0.9147

VI. CONCLUSIONS AND POLICY RECOMMENDATIONS

A. Conclusion

In recent decades, it is a vigorous period of the rapid development of China's Internet industry. The development of the Internet has driven many emerging industries, and e-commerce is one of them, and its development is unstoppable. For rural areas, e-commerce has changed the traditional economic form of farmers and brought infinite possibilities. Based on the dynamic panel data of 31 provinces in China from 2013 to 2020, this paper empirically analyzes the influence effect, transmission mechanism and heterogeneity of digital economy on rural e-commerce. The main conclusions are summarized as follows:

1) Digital economy can effectively promote the development of China's rural e-commerce: In the analysis of the influence mechanism of the development level of rural e-commerce, the conclusion is established from the aspects of the general index of digital economy development level, digital economy foundation, digital economy application level and digital economy innovation level, the national overall effect, regional effect and dimension effect. Digital economy foundation, digital economy application and digital economy innovation can all promote the development of rural e-commerce in China, among which the digital economy foundation has the strongest role in promoting the development of rural e-commerce. The first two with large weight in the foundation of digital economy are the telecommunication business volume of fixed telephone, which has important enlightenment for vigorously developing the foundation of digital economy.

2) Digital economy can promote the development of rural e-commerce by improving the upgrading and rationalization of the industrial structure: Digital economy promotes the evolution of industrial structure from a lower level to a higher level, and digital technology changes the traditional production mode.

The reshaping process means the network, collaborative and ecological production process, which will bring the advanced industrial structure; digital economy accelerates the optimal allocation of resources, optimizes the development of industrial structure, contribute to narrow the development gap of different dimensions, and make the resource allocation more reasonable.

3) There is regional heterogeneity in the promoting effect of digital economy on the development of rural e-commerce in China: Digital economy plays a great role in promoting the development of rural e-commerce in eastern China, and digital economy infrastructure plays the most significant role in promoting the development of rural e-commerce, so formulating regional differentiated policies for promoting the development of rural e-commerce. Follow the comparative advantages of regions and formulate differentiated digital economy development policies. The eastern region should continue to give full play to its existing advantages and further optimize financial support. Therefore, it is important to analyze the promoting role of the eastern region, learn from good methods and policies, and focus on the development of infrastructure.

B. Policy recommendations

We will increase network coverage and broadband construction in rural areas to ensure that farmers have easy access to the Internet and digital platforms. This will help to get through the information island and improve the development level of rural e-commerce.

Provide farmers with digital technology training and support, including training in e-commerce knowledge, e-payment and logistics management. It will help improve farmers' digital literacy and management ability, so that they can make better use of digital platforms for sales and marketing.

Policies will be formulated for rural e-commerce, including tax cuts, reducing fees for e-commerce platforms, and providing loans and financing support. This will encourage farmers to actively participate in e-commerce activities, reduce their operating costs, and promote the rapid development of rural e-commerce.

REFERENCE

[1] Zhan Jing and Lu Chuntao, “Study on the effect of digital economy on the development of rural e-commerce in China,” Research the world, no.09, pp. 3-11, 2022. DOI:10.13778/j.cnki.11-3705/c.2022.09.001

[2] Yang Ying, “Research on the effectiveness of government support for the development of rural e-commerce,” Social scientists, no.1, pp. 79-89, 2021. DOI:10.19863/j.cnki.issn.1002-3240.2021.01.011.

[3] Cheng Jie, “Analysis of the transformation mechanism of rural e-commerce in boosting the rural industrial structure,” Agricultural Economy, no.10, pp. 132-133, 2019.

[4] Liu Tong, “Innovation and Development Strategy of rural e-commerce platforms under the background of digital economy,” Business Economics Research, no.19, pp. 141-144, 2021.

[5] Gao Hong, Xu Lingling, and Dang Zhiqin, “Digital economy and the development of rural e-commerce from the perspective of differentiation,” Business Economics Research, vol.806, no.19, pp. 95-98, 2020.

[6] Li Hongxian, “Research on the development of rural e-commerce in the Era of digital Economy,” National Circulation economy, vol. 2291, no.23, pp. 15-17, 2021. DOI:10.16834/j.cnki.issn1009-5292.2021.23.005.

[7] Bai Peiwen and Zhang Yun, “Digital economy, declining demographic dividend and the rights and interests of middle- and low-skilled workers,” Economic Research, vol. 56, no.05, pp. 91-108, 2021.

[8] Chen Chong and Zhang Ruijin, “Digital economy empowers rural revitalization: Theoretical mechanism and empirical test,” Journal of Hebei Agricultural University (Social Science Edition), vol. 25, no. 02, pp. 14-26, 2023. DOI: 10.13320/j.cnki.jauhe.2023.0015.

[9] Feng Suling and Xu Dehui, “Analysis of the influence mechanism of digital industrialization on industrial structure upgrading — Based on the empirical analysis of China's inter-provincial panel data from 2010 to 2019,” Dongyue Lun Cong, vol. 43, no.01, pp. 136-149+192, 2022. DOI: 10.15981/j.cnki.dongyueluncong.2022.01.017.

[10] Wan Yuanyuan, Su Haiyang, and Liu Juan, “Factors and countermeasures of rural e-commerce development,” Business Economics Research, no. 02, pp. 140-142, 2020.

[11] Wang Yihai, “Research on the development level of rural e-commerce under the background of urban-rural integration,” Business Economics Research, vol. 796, no. 09, pp. 140-142, 2020.

[12] Yang Wenpu, “Research on industrial digital transformation measurement and regional convergence in China,” Economic system reform, no. 01, pp. 111-118, 2022.

[13] Yang Yang, Zhenghua Zhao, and Xiaoyan Zhang, “Research on Influencing Factors of Rural E-commerce Public Participation in Digital Economy,” Academic Journal of Business & Management, vol.4, no. 14, 2022.

[14] Zhang D L, “Analysis of the relationship between rural e-commerce and rural economic development,” Bus. Econ. Res, vol. 10: 131-133, 2020.