

Digital Marketing Empowers Rural Industrial Revitalization: Effect, Mechanism, and Heterogeneity Evidence from China

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ABSTRACT

This study examines the influence of digital marketing on rural industrial revitalization in China using panel data from 30 provinces over a ten-year period. Employing a two-way fixed-effects model, a two-step mediation model, and an instrumental variable approach, the empirical analysis yields three principal findings. First, digital marketing exerts a significant and robust positive effect on rural industrial revitalization. Second, technological innovation and urban-rural integration jointly serve as dual mediating channels through which digital marketing indirectly promotes rural industrial revitalization. Third, heterogeneity analysis reveals that the enabling effect of digital marketing is more pronounced in regions with non-agricultural industrial structures and in non-major grain-producing areas. These findings enrich the literature on the digital economy and rural revitalization, and offer evidence-based policy implications for differentiated rural industrial development strategies.

Keywords: digital marketing; rural industrial revitalization; technological innovation; urban-rural integration; two-way fixed-effects model

1. INTRODUCTION

Under the all-round carrying out of China's Rural Revitalization Strategy, industry revival holds the position of the foundation stone of whole rural development and the first driving force of high-quality agricultural and rural development. The Central No.1 Documents of 2025 and 2026 have in continuous sequence issued specific instructions on the digital development of countryside industries, and explicitly put forward the call for speeding up the building of modern agricultural product and agricultural input circulation networks, the pushing forward of high-quality development of rural electronic commerce, and the standardizing of agricultural product live-streaming commerce ^[1,2]. These policy documents have placed digital marketing—which includes rural e-commerce, live broadcasting, and internet brand management—as the core support of rural industrial prosperity promotion.

In the past recent years, digital marketing has obtained rapid wide growth within countryside industrial practice. By using core strong points including going beyond time and space limits, cutting down transaction expenses, and easing information unbalance between producers and consumers ^[8], therefore it has become a key tool for solving the long-existing hard problem of agricultural product selling and making rural industries become active again ^[16,17]. Even so, the carrying out of digital marketing in rural regions still stays in the exploring stage, and its specific roads of influence and inner mechanisms have not yet gotten systematic explanation.

Current researches, when they confirm the positive function of digital marketing for rural industry development, mostly put emphasis on single-scenario effect analyses, and have no systematic empirical test of its overall enabling effect and transmission mechanisms ^[13,14]. These research works seldom bring regional industrial structure and grain production attributes into heterogeneity analyses, and some among them have insufficient handling of endogeneity, hence lowering the reliability and practical guidance value of their conclusions.

Under this background, the present study uses panel data from 30 provinces of China that cover ten years. Through the usage of a two-way fixed-effects model, a two-step intermediation model, and an instrumental variable (IV) method ^[18], this article systematically makes research on the effect, mechanism, and heterogeneous features of the enabling function of digital marketing for rural industrial revitalization.

2. LITERATURE REVIEW AND RESEARCH HYPOTHESES

2.1 Digital Economy Enabling Rural Industrial Revitalization

The promotion function of the digital economy for countryside industry vitalization has been broadly confirmed in both internal and overseas studies. China's internal researches show that the countryside digital economy can effectively solve problems of short value chains and low additional value through the way of optimizing resource distribution, enlarging markets for agricultural products, and pushing forward industrial combination^[1, 2]. Deng^[3] and other persons discovered, through taking Guangdong Province as a research sample, that the enabling effect is gradually strengthened along with the promotion of digital infrastructure and thus displays obvious long-range features. Regional comparison researches find out obvious space difference: eastern areas, getting advantage from better digital basic facilities and factor movement, show stronger promotion functions than central and western areas^[4, 5].

On the international scope, Tiwasing et al.^[6] have proven that digital technology can destroy geographical obstacles and greatly strengthen the market connection of countryside enterprises in United Kingdom. Costa^[7] and other persons confirmed the application worth of Industry 4.0 digital techniques in the farming of rising economies from the angle of sustainable development.

With respect to the mechanisms of transmission, the already existing studies have constructed a many-dimensional framework that includes factor distribution, technique innovation, and city-countryside integration. Huang et al.^[8] have made verification that digital inclusion pushes forward the development of rural industries through the lowering of transaction costs and the optimization of the flowing of production factors. Chen et al.^[9], Liu^[10], Zhao and Yang^[11] have given confirmation that digital technology brings pushing function to agriculture technology innovation. Tian et al.^[12] put forward that the digital economy must promote two-way flows of urban and rural factors in order to realize deep enabling effects.

2.2 Digital Marketing Enabling Rural Industries: Progress and Limitations

The investigation regarding the influence of digital marketing upon the development of industry has step by step become deeper. Kamyabi^[13] and other persons and Matheus^[14] and other persons have made confirmation that the positive influence of digital marketing tactics on industrial achievement is from angles of customer participation and entrepreneur direction. On the aspect of countryside electronic commerce and digitized finance, Xu^[15] and other researchers have proved that digitized inclusive finance can effectively relax the restriction of financing in countryside industries, hence Guo^[16] and other researchers, Zhu and Liu^[17] hence checked and confirmed the important functions of countryside electronic commerce in helping the circulation of agriculture products and pushing the gathering of industries.

In the existing academic documents, three main limitations have been found. First, most researches inspect digital marketing inside the big frame of the digital economy, therefore lacking systemized actual testing that regards it as an independent core explain variable. Second, the double intermediate functions of technical innovation and city-country unification have not been examined at the same time in a single experience analysis frame. Third, the currently existing heterogeneity analyses mostly put their focus on geographic regions, hence they give limited attention to industrial structure and grain production attributes.

2.3 Research Hypotheses

H1: Digital marketing positively affects rural industrial revitalization. through the utilization of rural electronic commerce, on-line propaganda, and live-broadcasting commerce^[13, 14], digital selling effectively breaks the space-time limits of old-fashioned agricultural product selling.

H2: Urban-rural integration plays a positive mediating role in the relationship between digital marketing and rural industrial revitalization^[12], through breaking down urban-rural market barriers and promoting two-way flows of production factors.

H3: Technique innovation has the positive mediating function for this relation^[9, 10, 11], because digital platforms quicken the spread of agriculture technique, and market demand signals push the research and application of technique.

3. RESEARCH DESIGN AND DATA

3.1 Model Specification

For the purpose of examining the direct influence that digital marketing exerts upon the revitalization of rural industries, a two-way fixed-effects model has been constructed by us ^[18]:

$$Y_{it} = \alpha_0 + \alpha_1 X_{it} + \sum \beta_k C_{kit} + \mu_i + \lambda_t + \varepsilon_{it} \quad (1)$$

hereinto, Y_{it} stands for the synthesized scoring of rural industrial revitalization which belongs to province i when it is at time t ; X_{it} stands for the digital marketing degree level; C_{kit} is on behalf of the control variables; μ_i and λ_t are the fixed effects which belong to province and time; ε_{it} is the term of error.

To examine mediating mechanisms, a two-step mediation model is constructed following Jiang ^[18]:

$$M_{jit} = \delta_0 + \delta_1 X_{it} + \sum \delta_k C_{kit} + \mu_i + \lambda_t + \varepsilon_{it} \quad (2)$$

in which M_{jit} stands for mediation variable number j (the integration of city and village which is M1, or technical innovation which is M2); δ_1 represents the influence that digital marketing exerts upon every mediating variable.

3.2 Variable Definitions

3.2.1 Dependent Variable—Rural Industrial Revitalization (Y):

Based on the research that has been done before ^[19, 20, 21], one evaluation index system is built from four dimensions: agriculture efficiency, agriculture dimension, agriculture technology and agriculture income. The method of entropy weight is utilized to compute a combined score (Table 1).

Table 1. Rural Industrial Revitalization Index System

Dimension	Secondary Indicator	Formula	Direction
Agricultural Efficiency	Land Productivity	Agri. Output / Total Sown Area	+
	Labor Productivity	Primary VA / Primary Industry Employment	+
Agricultural Scale	Agricultural Scale	Total Agricultural Output Value	+
	Crop Development Scale	Grain Output	+
	Agro-processing Level	Processing Revenue / Total Agricultural Output	+
Agricultural Technology	Mechanization Capacity	Total Power of Agricultural Machinery	+
	Irrigation Capacity	Effective Irrigated Area	+
Rural Income	Rural Resident Income	Per Capita Disposable Income of Rural Residents	+
	Engel's Coefficient	Food Expenditure / Total Consumption Expenditure	—

Table 1. (continued) Rural Industrial Revitalization Index System

Dimension	Secondary Indicator	Formula	Direction
	Rural Cultural Stations	Number of Rural Cultural Stations	+

Note: “+” denotes a positive indicator; “-” denotes a negative indicator processed with normalization. Rural Cultural Stations is included under Rural Income as a proxy for cultural consumption capacity, reflecting quality-of-life improvements that accompany income growth in rural areas.

3.2.2 Core Explanatory Variable—Digital Marketing (X):

According to the former ^[22] study, rural electronic commerce sale income is chosen as the core target of digital marketing strength, which reflects the degree that digital marketing is used in the rural regions.

3.2.3 Mediating Variables:

(1) City-Countryside Integration (M1): A combined index which is built from four aspects—economic integration, social integration, spatial integration, ecological integration—it uses the entropy weight method (Table 2) ^[12]. (2) Technique New Creation (M2): It is measured through the counting of agriculture technique invention authorizations which come from the State Intellectual Property Office ^[9].

Table 2. Urban-Rural Integration Index System (Selected Indicators)

Dimension	Indicator	Formula	Dir.
Economic	Per Capita GDP	Direct data	+
	Dual Contrast Coef.	Primary VA/Emp. ÷ Sec.&Ter. VA/Emp.	+
	Income Gap	Urban / Rural Disposable Income	—
	Expenditure Gap	Urban / Rural Consumption	—
Social	Pension Coverage	Pension Participants / Population	+
	Education Investment	Education Exp. / Fiscal Exp.	+
	Healthcare Ratio	Urban / Rural Healthcare Exp.	—
Spatial	Urbanization Rate	Urban Pop. / Total Pop.	+
	Vehicle Ownership	Direct data	+
Ecological	Forest Coverage	Direct data	+
	Waste Treatment Rate	Direct data	+
	Public Toilet Density	Per 10,000 Persons	+

3.2.4 Control Variables:

(C1) urbanization ratio ^[12]; (C2) digitized basic facility (percentage of villages which have broadband open use) ^[3]; (C3) agricultural machine usage proportion; (C4) The share of primary industry. The data are obtained from the National Bureau of Statistics and the provincial statistical yearbooks.

3.3 Data Sources and Descriptive Statistics

We use the panel data of 30 Chinese provinces, which exclude Hong Kong, Macao, Taiwan and Tibet, that cover around ten years. The data our research uses are got from National Bureau of Statistics, each province's statistical yearbooks, China Rural E-commerce Development Report, and China Rural Revitalization Development Report ^[1,2,4,5]. The processing of lacking data is carried out by using linear interpolation and trend projection methods. The statistics which describe the situation are shown in Table 3.

Table 3. Descriptive Statistics of Main Variables

Variable	N	Mean	S.D.	Min	Max
Rural Revitalization	300	0.236	0.095	0.09	0.49
Digital Marketing	300	1811.4	2253.4	22.65	14457.9
Urban-Rural Integration	300	0.382	0.093	0.18	0.66
Agri. Tech. Patents	300	3723.6	3308.8	79	16651
Urbanization Rate	300	0.625	0.110	0.40	0.89
Digital Infrastructure	300	36.25	9.44	20.83	63.19
Agri. Mechanization	300	1.044	0.310	0.50	1.90
Primary Industry (%)	300	9.43	5.27	0.20	25.27

4. EMPIRICAL RESULTS

4.1 Multicollinearity Diagnostic

Every VIF value is lower than 5, far below the 10 critical Threshold, and the mean VIF is 2.85, which has confirmed that there is no serious multicollinearity existing (Table 4).

Table 4. VIF Test for Multicollinearity

Variable	VIF	1/VIF
Digital Marketing (X)	4.87	0.2055
Urbanization Rate (C1)	2.84	0.3526
Digital Infrastructure (C2)	2.75	0.3635
Agri. Mechanization (C3)	1.96	0.5092
Primary Industry (C4)	1.83	0.5465
Mean VIF	2.85	—

4.2 Baseline Regression Results

The Hausman examination therefore gives confirmation that a fixed-effects model can be utilized. The fifth table gives out the baseline regression result outcomes. The coefficients of digital marketing have obvious positive significance at the 1% level in all the setting schemes (columns 1–5), and still keep stable when control variables are added, thus it gives support to Hypothesis H1 ^[18]. In the control variables, the urbanization rate shows a remarkable negative influence, the digital

infrastructure shows a remarkable positive influence, and the agricultural mechanization rate shows a remarkable negative influence.

Table 5. Baseline Regression Results

Variable	(1)	(2)	(3)	(4)	(5)
Digital Mktg.	3.10e-6*** (3.66)	2.02e-6*** (2.86)	2.03e-6*** (3.13)	2.23e-6*** (3.38)	2.15e-6*** (3.23)
Urbanization	—	-0.403*** (-3.94)	-0.350*** (-3.67)	-0.366*** (-3.86)	-0.371*** (-3.93)
Digital Infra.	—	—	0.00117*** (3.90)	0.00112*** (3.73)	0.00112*** (3.72)
Mech. Rate	—	—	—	-0.0107** (-2.35)	-0.0108** (-2.38)
Primary Share	—	—	—	—	-0.000662 (-0.63)
Year/Province FE	Yes	Yes	Yes	Yes	Yes
N	300	300	300	300	300
R ²	0.984	0.986	0.987	0.987	0.987

t-statistics in parentheses. * p<0.1, ** p<0.05, *** p<0.01

4.3 Robustness Checks

Three robustness inspection works are carried out: (1) 1% winsorization; (2) the exclusion of the municipalities that are directly under the central government; (3) employment of one-period lagged explanation variable. Like what is displayed in Table 6, the coefficients of digital marketing still keep remarkable positive in all the three model settings, hence verifying the firmness of the baseline results.

Table 6. Robustness Check Results

Variable	(1) Winsorize	(2) Excl. Muni.	(3) Lag-1
Digital Marketing	1.81e-6** (2.54)	1.27e-6*	2.15e-6*** (3.23)
Urbanization Rate	-3.11e-4*** (-3.61)	-0.309***	-3.71e-4*** (-3.93)
Digital Infra.	8.08e-5*** (3.62)	0.001**	9.01e-5*** (3.72)
Controls / FE	Yes	Yes	Yes
N	277	244	300
R ²	0.9875	0.9912	0.9870

4.4 Endogeneity Test

The count of mobile phone subscribers is utilized by us as an instrumental variable for the purpose of digital marketing. In the regression of first stage, the IV coefficient is 1.376 ($p < 0.01$), therefore it confirms strong relatedness. The value of LM statistic is 4.692 ($p = 0.030$), it thus rejects the problem of under-identification. The Kleibergen-Paap F-statistic value is 55.79, it greatly surpasses the Stock-Yogo 10% critical value which is 16.38, thus it eliminates the worry about weak

instruments. In the two-stage regression, the digital marketing coefficient is 3.82×10^{-6} ($p < 0.05$), therefore it further confirms the positive enabling effect (Table 7).

Table 7. IV Estimation Results

Variable	(1) 1st Stage	(2) 2nd Stage
IV (Mobile Users)	1.376*** (0.144)	—
Digital Marketing	—	3.82e-6** (1.61e-6)
K-P LM Statistic	—	4.692** (p=0.030)
K-P F-Statistic	—	55.79 > 16.38
Province / Time FE	Yes	Yes
N	300	300
R ²	0.900	0.243

4.5 Heterogeneity Analysis

We carry out division on this sample according to two attributes: industrial structure and grain production. Like what Table 8 shows, the promoting effect of digital marketing is meaningful at the 1% level in regions not dominated by agriculture but only has faint significance (10%) in regions dominated by agriculture^[4,5]. Inside the regions which do not produce large amount of grain, this coefficient has significance on the 5% level, but the effect does not have statistical significance inside the main grain-producing regions^[16,17]. These findings tell us that regions with digital variety and product difference can get bigger advantages from digital selling, and this accords with the basic thinking of market covering, brand construction, and product difference.

Table 8. Heterogeneity Analysis

Variable	(1) Agri-Dom.	(2) Non-Agri.	(3) Grain	(4) Non-Grain
Digital Marketing	7.42e-6* (3.73e-6)	3.38e-6*** (1.08e-6)	8.07e-7 (7.88e-7)	2.96e-6** (1.22e-6)
Urbanization	-0.388*	-0.498***	-0.134	-0.411**
Digital Infra.	5.73e-4*	1.50e-3**	4.66e-4**	1.69e-3**
Province/Time FE	Yes	Yes	Yes	Yes
N	148	149	130	170
R ²	0.9875	0.9838	0.9891	0.9742

Standard errors in parentheses. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

5. MEDIATION ANALYSIS

After we have already confirmed the positive direct effect in the baseline regression, this research therefore continues to study the transmission mechanisms according to the two-step method put forward by Jiang^[18]. According to what is displayed in Table 9, digital marketing brings a notable positive influence upon both technological innovation (column 1, $p < 0.01$) and urban-rural integration (column 2, $p < 0.01$), thus carrying out the verification on Hypotheses H3 and H2, separately.

The double intermediary theory framework points out that digitized marketing makes countryside industrial promotion become possible through both outside and inside pushing forces: the city-countryside amalgamation path strengthens the outside that can support ability through pushing element flowing, hence the technical innovation path breeds internal growth power through pushing forward agricultural scientific technology^[9,11]. These two ways mutually supplement each other, therefore they constitute the entire enabling mechanism of digital marketing.

Table 9. Mediation Analysis Results

Variable	(1) M2 (Tech.)	(2) M1 (Urban-Rural)	(3) Y (Revitalization)
Digital Marketing (X)	6.97e-6*** (6.98)	0.400*** (3.60)	2.15e-6*** (3.23)
Constant	0.187*** (3.37)	-1838.2 (-0.57)	0.441*** (7.04)
Controls / FE	Yes	Yes	Yes
N	300	300	300
R ²	0.987	0.907	0.987

t-statistics in parentheses. * p<0.1, ** p<0.05, *** p<0.01

6. CONCLUSIONS AND POLICY IMPLICATIONS

6.1 Principal Conclusions

This research obtains three main conclusions. First, digital marketing has a strong and obvious positive promotion effect for rural industrial revitalization^[1,2], hence it can be confirmed as an important micro-level driving force that is able to break through traditional industrial bottlenecks. Second, technique innovation^[9,10,11] and city-country unification^[12] together make up a two-way passing system: the city-country unification road strengthens outside support ability through element movement, thus the technique innovation road breeds inside growth power. Third, the promotion effect displays obvious difference^[4,5], with regions not dominated by agriculture and areas that are not main grain producing regions obtaining bigger benefits, hence this shows that policy making which fits local conditions is necessary.

6.2 Policy Implications

Firstly, the governments ought to consolidate the digital infrastructure^[3], especially in central and western areas, and systematically push forward the digital literacy training among peasants to lower the obstacles for the adoption of digital marketing.

Second, in order to enlarge dual mediating influences, policy makers ought to push forward urban-rural factor flowing, urge urban capital, technology, and talented persons to move to rural regions, and promote agricultural R&D subsidies^[9] for promoting the transformation of science outcomes into productive use.

Third, therefore, difference-based promotion methods must be carried out^[4,5,16,17]: regions which are not mainly for agriculture should combine digital promoting with country travel and farm product processing; Regions which are mainly dominated by agriculture should put their focus on getting over the bottlenecks of digitalization before they carry out the transition to brand-oriented marketing; The main grain output regions ought to optimize digital distribution roads while at the same time training digital marketing ability for high-value special products; The regions which are not main grain-producing areas ought to accelerate the establishment of brands via digital selling methods, in order to make the market premium reach the maximum level.

Fourth, the cooperative development strategies ought to make balance between urban construction and country revitalization^[12], restrain the excessive flowing out of high-quality rural basic elements, and push the deep mixing of first, second, third industries to construct a continuous living system for the high-quality digital development of rural industries.

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