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Research on the Promoting Effect of Industrial Integration in Western Guangdong Region on Farmers' Entrepreneurship

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Abstract: Industrial integration has injected new impetus into farmers' entrepreneurship by promoting the coordinated development of counties, towns and villages, and provided systematic support for farmers' entrepreneurship in terms of resource integration, market expansion and value enhancement. As a concentrated area of major agricultural cities in Guangdong Province, the western part of Guangdong has unique resource endowments. However, farmers' entrepreneurship is confronted with pain points such as insufficient technology, lagging market information, and difficulty in cross-regional resource integration. The research suggests that by building an industrial integration service platform, strengthening technological empowerment and brand cultivation, the promoting effect of industrial integration on farmers' entrepreneurship should be further released, and the participation rate and success rate of farmers' entrepreneurship should be enhanced. This paper aims to systematically analyze the direct effects, intermediary mechanisms and spatial spillover effects of industrial integration in the western Guangdong region on farmers' entrepreneurship, identify the practical obstacles it faces, and then propose optimization paths to provide references.

Keywords: Industrial Integration; Farmers' Entrepreneurship; Influence Mechanism; Mediating Mechanism

1. Introduction

Industrial integration is an important measure to implement the rural revitalization strategy and increase farmers' income. Due to reasons such as the small scale of traditional farmers' entrepreneurship, poor risk resistance, limited endowment resources and insufficient social capital, farmers' entrepreneurial capabilities are usually low.[1], and the sustainability and success rate of their entrepreneurship are not high. With the in-depth implementation of industrial integration in the western part of Guangdong Province, new breakthroughs have been brought to farmers' entrepreneurship. By promoting the coordinated development of counties, towns and villages and guiding the deep integration of agriculture with processing, culture and tourism, e-commerce and other industries.[2], it not only provides external support such as policy support and resource integration for farmers' entrepreneurship, but also reshapes the industrial form and market boundaries of rural areas, giving rise to diverse entrepreneurial scenarios. Against this backdrop, it is of great theoretical and practical significance to explore how industrial integration can break through the traditional predicament of farmers' entrepreneurship, its specific promotion mechanisms and practical obstacles.[3]. Based on this, focusing on the western Guangdong region to explore the promotion mechanism of industrial integration on farmers' entrepreneurship, systematically analyzing the promoting effect of industrial integration on farmers' entrepreneurship, practical difficulties and optimization paths, can not only fill the gap in regional research, but also provide practical references for similar major agricultural production areas.

2. Theoretical Analysis and Research Hypotheses

By promoting the coordinated development of counties, towns and villages, and taking the integration of rural industries as the core path to activate farmers' entrepreneurship, the essence is to reconstruct the allocation model of rural production factors and the logic of value creation through the in-depth collaboration of agriculture with processing, culture and tourism, e-commerce and other industries.[4]. Combining the theoretical connotation of rural industrial

integration, its influence mechanism on farmers' entrepreneurship can be developed from three aspects: direct effect, mediating effect and spatial spillover effect.

2.1 The Direct Promoting Effect of Rural Industrial Integration on Farmers' Entrepreneurship

The integration of rural industries directly empowers farmers to start businesses by expanding entrepreneurial scenarios and lowering the threshold for entrepreneurship. From the supply side, industrial integration promotes the extension of the agricultural industrial chain (such as deep processing of agricultural products and rural tourism), providing farmers with diverse entrepreneurial options of "production + service" and "online + offline". From the demand side, the integration of resources guided by policies (such as land transfer and cold chain logistics construction) has reduced the element constraints for entrepreneurship, while the connection of urban and rural consumer markets (such as e-commerce platforms matching urban demands) has expanded the market space for entrepreneurial projects. In addition, the agglomeration effect formed by industrial integration (such as homestay clusters and agricultural product processing parks) further reduces the risks and costs of individual entrepreneurship by sharing infrastructure and customer sources. Based on this, it is proposed that:

Hypothesis 1: The degree of integration of rural industries has a significant positive impact on the participation rate and success rate of farmers' entrepreneurship.

2.2 The Intermediary Mechanism for Promoting Farmers' Entrepreneurship Through Rural Industrial Integration

The impact of rural industrial integration on farmers' entrepreneurship is not through a single direct path, but is transmitted through multiple mediating variables.[5]. Industrial integration enhances farmers' digital skills (such as live-streaming e-commerce) through non-agricultural employment and strengthens their entrepreneurial capabilities (not just consumption capacity).

2.2.1 The effect of increasing farmers' income
Industrial integration accumulates initial capital for farmers to start businesses and alleviates financial constraints by enhancing the added value of agricultural products (such as deep processing) and increasing operating income (such as the operation of homestays).[6]. Moreover, with the development of rural industrial integration, the agricultural service industry has been continuously expanding, and the management technology and service level of the industry have been rapidly improved. The allocation of resources has been further optimized, significantly reducing the operating costs of agricultural-related enterprises. This, in turn, is conducive to converting the profits of enterprises into the actual income of farmers through the improvement of the income distribution mechanism, thereby enhancing the economic benefits of farmers. The development of new industries and business forms in rural areas, especially the integration of rural industries, has promoted the extension of industrial chains and value appreciation, effectively increasing farmers' income.[7]. This increase in income has accumulated the initial capital needed for farmers to start businesses and alleviated the financial constraints they face in their entrepreneurial journey.

2.2.2 The empowerment effect of non-farm employment
The integration of rural industries provides a large number of non-agricultural employment opportunities in rural areas, breaks through the single employment structure in traditional agriculture, and promotes the transfer of labor force from low-efficiency agricultural production to high-efficiency non-agricultural industries. This helps increase farmers' non-agricultural income and promotes the accumulation of human capital through the spillover effect of technology.[8], thereby achieving a dual improvement in farmers' income and employment quality. Farmers in the western part of Guangdong Province can accumulate valuable skills and experience in these non-agricultural positions, such as agricultural product processing, logistics, marketing and rural tourism services. The stable wage income also enhances their risk resistance, making them more confident when starting their own businesses.

2.2.3 The effect of industrial structure upgrading
The integration of rural industries promotes the upgrading of the agricultural industrial structure through the reconfiguration of production factors. From the perspective of industrial

structure upgrading, the integration of rural industries promotes the extension of agriculture towards high value-added links, which puts forward higher requirements for farmers' entrepreneurial capabilities and further forces farmers to improve their own qualities. During the process of industrial integration, agriculture has gradually developed in the directions of brand marketing, refined processing, and technological production. This has prompted farmers to proactively enhance their entrepreneurial capabilities, including learning new management concepts, mastering market analysis methods, and applying digital tools, in order to adapt to the trend of industrial integration and development. Based on this, it is proposed that:

Hypothesis 2: The integration of rural industries indirectly promotes farmers' entrepreneurship by increasing farmers' income, promoting non-agricultural employment, and facilitating the upgrading of the agricultural industrial structure. That is, the three play an intermediary role between industrial integration and farmers' entrepreneurship.

2.3 The Spatial Spillover Effect of Rural Industrial Integration on Farmers' Entrepreneurship

The "county-town-village linkage" feature of industrial integration in the western part of Guangdong Province has broken the regional barriers of rural entrepreneurship, making the entrepreneurial promotion effect of industrial integration show the feature of cross-regional diffusion.[9]. Integrated entrepreneurial projects in core areas (such as e-commerce industrial parks and rural tourism demonstration zones) drive farmers in surrounding villages and towns to imitate and start businesses through technology diffusion (such as sharing of live-streaming sales experience) and factor flow (such as cross-regional supply chain cooperation). Meanwhile, policy coordination among regions (such as cross-county industrial alliances) has reduced the cost of obtaining entrepreneurial resources, forming a "demonstration-radiation" entrepreneurial ecosystem. Based on this, it is proposed that:

Hypothesis 3: The promotion effect of rural industrial integration on farmers' entrepreneurship has a positive spatial spillover effect, that is, the improvement of the industrial integration level in a certain area will significantly promote the increase of farmers' entrepreneurial activity in neighboring areas.

3. Research Design

3.1 Sources of Data

The data of this study are derived from both macro and micro dimensions. The regional statistical data at the macro level are selected from the panel data of the western Guangdong region (Zhanjiang, Maoming, Yangjiang, Yunfu, etc.) from 2014 to 2023. The indicators include the level of industrial integration, farmers' income, and the proportion of non-agricultural employment, etc. The data are sourced from the "Guangdong Statistical Yearbook" and the "Statistical Bulletin on the National Economic and Social Development of the Four Cities in Western Guangdong". From February to May 2025, a questionnaire survey was conducted in 100 administrative villages across 12 counties (districts) in western Guangdong Province. Stratified random sampling was adopted, with at least 10 households in each village and a questionnaire recovery rate of 82%. A total of 1,367 valid questionnaires were collected. It covers information such as farmers' participation in entrepreneurship, the degree of industrial integration, and income levels. The research area takes into account different terrains such as plains, mountains and coastal areas to ensure the representativeness of the samples.

3.2 Variable Setting

The selection and interpretation of the explained variables, core explanatory variables, mediating variables and control variables in the research design are shown in Table 1.

3.3 Model Construction

3.3.1 Benchmark regression model

To verify the direct effect of industrial integration on farmers' entrepreneurship, a panel Logit model is constructed:

$$CE_{it}=\alpha_0+\alpha_1 IND_{it}+\alpha_2 CV_{it}+\mu_i+\lambda_t+\varepsilon_{it} \quad (1)$$

Among them，(CE_{it}) is the explained variable (entrepreneurial participation rate or success rate), (IND_{it}) is the level of industrial integration, (CV_{it}) is the control variable, (μ_i) is the individual fixed effect，(λ_t) is the time fixed effect，and (ε_{it}) is the random error term.

3.3.2 Mediating effect model

Referring to Wen's three-step method. [10], a chain intermediary model is constructed:

$$M_{it}=\beta_0+\beta_1 IND_{it}+\beta_2 CV_{it}+\mu_i+\lambda_t+\varepsilon_{it} \quad (2)$$

$$CE_{it}=\gamma_0+\gamma_1 IND_{it}+\gamma_2 M_{it}+\gamma_3 CV_{it}+\mu_i+\lambda_t+\varepsilon_{it} \quad (3)$$

Among them, (M_{it}) is the intermediary variable (INC, NAG, STR). If both (β_1) and (γ_2) are significant, and the absolute value of (γ_1) is smaller than that of (α_1) in the benchmark model, the intermediary effect is established.

Table 1. Variable Setting Table

Variable Type	Variable Name	Symbol	Variable Definition and Assignment
Explained Variables	Farmers' entrepreneurship participation rate	CE1	Whether to engage in individual operation or private enterprise (1 = Yes, 0 = No)
	Farmers' entrepreneurship success rate	CE2	Whether the entrepreneurial project has been in operation for more than 3 years (1 = Yes, 0 = No)
Core Explanatory Variable	Rural industrial integration	IND	The weight of each indicator is determined by entropy method (processing output value 0.4 / leisure agriculture 0.3 / e-commerce 0.3): 1. Industrial chain extension (agricultural product processing output value / total agricultural output value) 2. Functional expansion (proportion of leisure agriculture income) 3. Technology penetration (proportion of rural e-commerce transaction volume)
Intermediary Variables	Farmers' income	INC	Per capita disposable income of rural residents (yuan/year)
	Non-agricultural employment	NAG	Proportion of employment in secondary and tertiary industries to total rural employment (%)
	Industrial structure upgrading	STR	Ratio of tertiary industry output value to secondary industry output value
Control Variables	Age	AGE	Actual age of respondents (years)
	Years of education	EDU	schooling years
	Health status	HEA	Self-rated health level (1 = Poor, 5 = Excellent)
	Digital inclusive finance index	FIN	Regional digital finance development index
	Financial support for agriculture	FIS	Proportion of agriculture, forestry and water expenditure in local fiscal general budget expenditure (%)
	Traffic density	TRA	Ratio of total regional highway mileage to administrative area (km/square km)

3.3.3 Spatial econometric model

The Spatial Durbin Model (SDM) is used to capture the spatial spillover effect:

$$CE_{it}=\delta_0+\delta_1 IND_{it}+\delta_2 W\cdot IND_{it}+\delta_3 W\cdot CE_{it}+\delta_4 CV_{it}+\mu_i+\lambda_t+\varepsilon_{it} \quad (4)$$

Among them, W is the spatial weight matrix (using geographical distance weight, i.e., the reciprocal of the distance between two regions), ($W\cdot IND_{it}$) is the weighted average of industrial integration levels in neighboring regions, and (δ_2) measures the spatial spillover effect.

4. Empirical Results and Analysis

4.1 Benchmark Regression Results

The estimated results of the direct effect of industrial integration on farmers' entrepreneurship in the western Guangdong region are shown in Table 2. The regression coefficient of the core explanatory variable, industrial integration (IND), for the entrepreneurial participation rate was 0.385 (p<0.01), and for the entrepreneurial success rate was 0.327 (p<0.01). The statistical significance of both passed the 1% level test, indicating that for every 1-unit increase in the level of industrial integration, the probability of farmers' entrepreneurial participation increased by 38.5%. The probability of entrepreneurial

success has increased by 27.7%, and Hypothesis 1 has been strictly verified. This result confirms the empowering effect of industrial integration on farmers' entrepreneurship by expanding entrepreneurial scenarios and reducing factor constraints.

Among the control variables, the coefficients of years of education (EDU) on the participation rate and success rate of entrepreneurship were 0.205 (p<0.01) and 0.182 (p<0.01), respectively, indicating that the accumulation of human capital is an important prerequisite for farmers to seize the opportunities of industrial integration. The positive and significant impact of digital inclusive Finance (FIN) (0.236, p<0.01) indicates that financial support plays a key role in alleviating entrepreneurial constraints. The negative coefficient of AGE (-0.018, p<0.01) reflects the comparative advantages of the youth group in accepting new business forms of industrial integration and undertaking entrepreneurial risks.

Table 2. Benchmark Regression Results

Variable	Entrepreneurship Participation Rate	Entrepreneurship Success Rate
IND	0.385***	0.327***
AGE	-0.018***	-0.015**
EDU	0.205***	0.182***
HEA	0.095*	0.087*
FIN	0.236***	0.215***
FIS	0.115**	0.103**
TRA	0.075*	0.068*
Constant term	-1.356***	-1.243***
Pseudo R²	0.425	0.386

4.2 Intermediary Effect Test

The results of the effect test are shown in Table 3, which deeply analyzes the internal mechanism by which industrial integration promotes farmers' entrepreneurship. On the path of farmers' income (INC), the influence coefficient of industrial integration on income was 0.456 (p<0.01), clearly indicating that industrial integration significantly enhanced the income level of farmers in the western Guangdong region. For instance, relying on the brand of "China's Hometown of Huajuhong", Huazhou City has extended the deep processing chain of Huajuhong, and the income of many farmers participating in the Huajuhong industry integration project has increased significantly. The coefficient of farmers' income on the participation rate of entrepreneurship was 0.298 (p<0.01), and the mediating effect accounted for as high as 36.8%. This fully demonstrates that industrial integration, by increasing farmers' income, accumulates the initial capital needed for farmers to start businesses and effectively promotes farmers' entrepreneurship.

In the non-farm employment (NAG) path, the coefficient of industrial integration on non-farm employment is 0.423 (p<0.01). In places like Yangjiang, with the deep integration of Marine cultural industries with tourism and agriculture, a large number of non-agricultural jobs such as tour guides and seafood processing have been created. The coefficient of non-farm employment to the participation rate of entrepreneurship was 0.225 (p<0.05), and the mediating effect accounted for 25.6%. Farmers have accumulated skills and experience in these non-agricultural positions, laying a foundation for their subsequent entrepreneurship.

In terms of the path of industrial structure upgrading (STR), the coefficient of industrial integration on structural upgrading is 0.568 (p<0.01). In Maoming, through the implementation of the "Five-Chain Co-construction" project, a development model of "project - industrial chain - industrial cluster" has been established, promoting the optimization and upgrading of the industrial structure. The coefficient of industrial structure upgrading on the participation rate of entrepreneurship was 0.201 (p<0.05), and the mediating effect accounted for 29.4%. The upgrading of industrial structure prompts farmers to enhance their entrepreneurial capabilities to adapt to the new demands of industrial development, thereby promoting entrepreneurship.

Table 3. Intermediary Effect Test Results

Path	Industrial Integration → Intermediary Variable	Intermediary Variable → Entrepreneurship Participation Rate	Proportion of Intermediary Effect
Farmers' income (INC)	0.456***	0.298***	36.8%
Non-agricultural employment (NAG)	0.423***	0.225**	25.6%

Industrial structure upgrading (STR)	0.568***	0.201**	29.4%

4.3 Test of Spatial Spillover Effect

The estimation results of the spatial Durbin model are shown in Table 4. The direct effect coefficient of industrial integration is 0.356 (p<0.01), indicating that the improvement of the local industrial integration level has a significant promoting effect on farmers' entrepreneurship. The coefficient of the spatial interaction term (W · IND) was 0.215 (p<0.05), indicating that for every 1 unit increase in the industrial integration level of neighboring areas, the participation rate of farmers' entrepreneurship in this area increased by 21.5%. This result reflects that under the "county-town-village linkage" mechanism in the western Guangdong region, The entrepreneurial promotion effect of industrial integration forms spatial spillover through technology diffusion (such as the sharing of e-commerce operation experience) and factor flow (cross-regional supply chain cooperation). The spatial autocorrelation coefficient (W · CE=0.276, p<0.01) indicates that farmers' entrepreneurial behavior itself has spatial agglomeration characteristics, further strengthening the importance of regional coordinated development.

Table 4. Estimation Results of Spatial Durbin Mode

Variable	Coefficient	Standard Error
IND	0.356***	0.092
W·IND	0.215**	0.081
W·CE	0.276***	0.098
Constant term	-1.238***	0.335
Spatial R²	0.456	

5. Discussion

Although the promoting effect of industrial integration in the western Guangdong region on farmers' entrepreneurship has been empirically verified, it still faces multiple structural contradictions in practical implementation, which restricts the full release of the mechanism's effectiveness. From the perspective of the industrial chain, agricultural production within the region is still dominated by the supply of primary products. The deep processing of agricultural products is weak and the ability to extract added value is insufficient. Most farmers' entrepreneurial projects are concentrated in the front-end links of planting and breeding or simple sorting and packaging of the industrial chain. The participation in deep processing and brand operation is low. The value-added effect of industrial integration is difficult to be effectively transmitted to the group of farmers who start businesses. This feature of "shortening the industrial chain" is not well matched with the regional agricultural resource endowment. It not only reduces the depth to which farmers can share the dividends of industrial integration but also restricts the sustainable profitability of entrepreneurial projects.

From the perspective of factor support, there is a significant mismatch between the non-agricultural jobs generated by industrial integration and the entrepreneurial skills demands of farmers. The overall educational level of farmers in the western part of Guangdong Province is relatively low, and they have insufficient mastery of essential entrepreneurial skills such as the application of digital technology and modern business management. This leads to a low efficiency in converting non-agricultural employment experience into entrepreneurial capabilities. Most practitioners can only participate in low-skill service links and find it difficult to achieve entrepreneurial breakthroughs through experience accumulation. Meanwhile, the imperfection of the regional coordination mechanism has further exacerbated the fragmentation of resource allocation. In addition, there is still room for improvement in the precision of the policy support system. The current support measures mostly focus on the infrastructure construction of industrial integration projects, while the supporting services such as skills training and credit support for farmers' entrepreneurship are insufficient. This has led to a disconnection between policy supply and the actual needs of entrepreneurial entities, and has failed to effectively address the capacity and financial constraints faced by farmers' entrepreneurship. The accumulation of these predicaments has kept the empowerment effect of industrial integration in the western Guangdong region on farmers' entrepreneurship at a primary stage, and it is urgent to solve this problem through systematic reform.

6. Research Conclusions and Policy Recommendations

6.1 Research Conclusions

The research finds that the industrial integration in the western Guangdong region has a significant direct promoting effect on farmers' entrepreneurship. Its mechanism of action is mediated and transmitted through three paths: increasing farmers' income, empowering non-agricultural employment, and upgrading the agricultural industrial structure. Moreover, this promoting effect shows a significant positive spatial spillover feature. This conclusion not only verifies the effectiveness of industrial integration as an optimization mechanism for the rural entrepreneurial ecosystem at the theoretical level, but also reveals the feasibility of activating entrepreneurial vitality in the western part of Guangdong Province by relying on its agricultural resource endowment at the practical level. However, the practical contradictions such as the poor transmission of value-added caused by the shortening of the industrial chain, the low efficiency of the transformation of entrepreneurial capabilities due to the mismatch of factors, and the fragmentation of resource allocation caused by insufficient regional coordination still restrict the deep coupling of industrial integration and farmers' entrepreneurship.

6.2 Policy Recommendations

Based on the above conclusions, policy optimization should focus on resolving structural contradictions to unleash the entrepreneurial empowerment potential of industrial integration. On the one hand, it is necessary to take the extension of the industrial chain and value reconstruction as the core, cultivate industrial clusters led by leading enterprises, guide farmers' entrepreneurship to penetrate into high value-added links such as deep processing and brand operation, and strengthen the transmission mechanism of integration dividends to entrepreneurial entities. On the other hand, a support system for element adaptation and regional coordination should be established. Customized skills training should be provided to enhance farmers' digital application and management capabilities. Credit system innovation should be combined to alleviate the constraints of start-up funds. At the same time, a cross-regional coordination mechanism should be set up to optimize industrial layout and reduce the cost of element flow, promoting the transformation of spatial spillover effects into the driving force for entrepreneurship throughout the region. This systematic measure can not only enhance the empowerment intensity of industrial integration for farmers' entrepreneurship, but also improve the collaborative efficiency of the regional entrepreneurial ecosystem.

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