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Analysis of Coupling and Coordination Between High-Quality Agricultural Development and Digital Economy

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Abstract

Enhancing the efficiency of agricultural resource allocation is a key driving force for achieving high-quality agricultural development. As an emerging engine, digital economy can optimize the structure of agricultural resource allocation to the greatest extent, promoting the digital transformation of agricultural production, thereby facilitating the synergistic progress between the digital economy and high-quality agricultural development. This paper uses the entropy method to calculate the comprehensive index of high-quality agricultural development and the comprehensive index of digital economic development for six provinces in central China from 2011 to 2022, and constructs a coupling coordination model to measure and analyze both indices. The results show that the comprehensive index of high-quality agricultural development and the comprehensive index of digital economic development in the six central provinces are generally at a high-level coupling stage. In terms of coupling coordination, Anhui Province, Henan Province, Hubei Province, and Hunan Province are at the initial coordination level, Jiangxi Province is at the barely coordinated level, and Shanxi Province is on the verge of imbalance. To strengthen the coupling coordination between the digital economy and high-quality agricultural development, this paper proposes countermeasures and suggestions for promoting high-quality agricultural development, including enhancing the application of digital technology in agriculture, driving the digital transformation of the entire agricultural industry chain, cultivating digital agriculture talent and innovative ecosystems, and improving the policy and legal system related to agricultural digitalization.

Keywords: high-quality development of agriculture, digital economy, entropy method, coupling coordination degree

1. Introduction

Enhancing digitalization, networking, and intelligence capabilities is key to adapting to rapid technological progress and economic development. Innovating traditional industries and leveraging the digital economy to promote high-quality industrial development is crucial for fostering high-quality economic growth. Agriculture, as a foundational sector of the national economy, bears the responsibility of driving high-quality development and serves as the core force leading this process, profoundly impacting China's economy and people's livelihoods. Promoting agricultural modernization and achieving high-quality development are important measures for China's agricultural development. Currently, the digital economy is developing rapidly, with technologies such as 5G, cloud computing, big data, and the Internet of Things deeply integrated into various agricultural sectors. The digital economy enhances the efficiency of allocating production factors, capital, and human capital in agriculture by integrating data and information resources, thereby improving agricultural productivity and quality, and promoting high-quality agricultural development. Researching the impact of the digital economy on high-quality agricultural development in central China has theoretical value. This paper selects six provinces in central China from 2011 to 2022 as samples, constructs a model for the coupling coordination degree between the digital economy and high-quality agricultural development, evaluates their coordinated development levels, provides decision support for relevant departments, and promotes the deep integration and development of the digital economy and agriculture.

2. Literature Review

In recent years, academic achievements related to high-quality agricultural development and the digital economy have shown a significant growth trend. In terms of high-quality agricultural development, Zhang Lu and Luo Biliang (2020) pointed out that the goal of high-quality agricultural development is to ensure output, improve efficiency and increase farmers' income. Zhang Faming et al. (2021) constructed the corresponding evaluation

index system based on the five major development concepts; Zhong Yu (2018) sorted out the key indicators for measuring high-quality agricultural development, including product quality, profitability, production systems and competitiveness in the international market. In terms of the digital economy, it brings new opportunities for the high-quality development of the real economy. At present, there are various methods for measuring the development level of the digital economy. Jiao Shuaitao and Sun Qiubi (2021) calculated the development level of the digital economy from four dimensions: digital infrastructure, application practice, innovation ability, and the impact of change. Zhao Tao et al. (2020) measured the development level of the digital economy by measuring the development degree of digital infrastructure and digital inclusive finance in various regions. Liu Jun et al. (2020), taking into account the close connection between the digital economy and informatization, the Internet and digital transactions, calculated the index of China's digital economy, revealing its rapid growth trend. At the same time, they pointed out that the "digital divide" and polarization problems between regions are relatively obvious.

At present, agricultural modernization is an important driving force for promoting economic growth, and the core role of the digital economy in it is increasingly prominent. The process of informatization and intelligence has a crucial impact on the high-quality development of agriculture. Research has confirmed that the digital economy can effectively accelerate the progress of agriculture and rural areas. Luo Qianfeng et al. (2022) hold that in the field of digital economy, digital technology plays a crucial role. It plays a key role in the agricultural production system, operation system and industrial system, and helps agriculture achieve high-quality development. Qi Wenhao et al. (2022) found through their research on the innovation of rural economic development models that the digital economy can narrow the gap between urban and rural development and thereby promote high-quality agricultural development.

Based on the in-depth exploration of high-quality agricultural development and the digital economy in the existing literature, researchers have comprehensively expounded on the connotations of related concepts and the construction of their indicator systems, providing a theoretical basis for the subsequent evaluation of high-quality agricultural development. However, research on the relationship of mutual promotion and coordinated development between the two is still insufficient, and most of the existing studies focus on specific provinces and cities, mainly through qualitative analysis. This study aims to use quantitative analysis methods to explore the coupling and coordination between high-quality agricultural development and the digital economy in the central region. The comprehensive index of high-quality agricultural development and the comprehensive index of digital economic development in six provinces in the central region from 2011 to 2022 were calculated by the entropy method, and the coupling coordination relationship between the two was quantitatively measured by using the coupling coordination degree model, aiming to provide strategic suggestions for the coordinated progress of high-quality agricultural development and the digital economy.

3. Theoretical Mechanism and Index System Construction

3.1 Theoretical Mechanism

The concept of coupling originated in physics and describes the degree of interconnection between two subsystems or categories. In this article, the term "coupling" is used to refer to the mutually reinforcing relationship between the digital economy and the high-quality development of agriculture. By calculating the coupling coordination degree between the comprehensive index of high-quality agricultural development and the comprehensive index of digital economic development, the strength of the relationship between them can be quantified, and data support can be provided for the study of their coupling coordination. The internal mechanism for the coordinated development of the digital economy and high-quality agriculture is as follows:

On the one hand, the digital economy provides strong support for the high-quality development of agriculture. By applying advanced means such as information processing technology and big data analysis, the agricultural field has been able to effectively solve a series of problems faced by traditional agriculture. These technologies have significantly enhanced agricultural production efficiency, enabling the agricultural industry to achieve upgrading and transformation.

On the other hand, the high-quality development of agriculture helps the digital economy achieve an innovative leap. The huge potential of the agricultural market has a powerful force to stimulate financing demand, thereby promoting the growth of the digital economy. With the advancement of agriculture, digital infrastructure has been further improved, and capital investment has gradually increased. Infrastructure investment has optimized the development environment and reduced construction costs.

3.2 Construction of Evaluation Index System

When constructing the indicator system for high-quality agricultural development, the indicators selected by Zhao Feng (2023), Shi Xiaokun and Song Penghe (2023), Yao Yuchun and Li Bing (2023), as well as the relevant indicators in the "China Rural Statistical Yearbook" were referred to. The level of high-quality agricultural development is measured by agricultural innovative development, coordinated agricultural development, green agricultural development, open agricultural development and shared agricultural development. Five first-level indicators and 18 second-level indicators for high-quality agricultural development have been constructed. When constructing the indicator system for the development of the digital economy, referring to the indicators selected by Guo Feng et al. (2020) and Wang Jun et al. (2021), as well as the relevant indicators in the "China Industrial Statistical Yearbook", digital infrastructure, digital industrialization and industrial digitalization were adopted to measure the development level of the digital economy. Three first-level indicators and twelve second-level indicators for the development of the digital economy were constructed. The comprehensive evaluation index system for high-quality agricultural development and digital economic development is shown in Table 1 and Table 2.

Table 1. Evaluation index system for High-Quality agricultural development

Primary indicators	Secondary indicators	attribute
Innovation in agricultural development	The proportion of science expenditure in three categories	+
	Degree of agricultural mechanization	+
	R&D investment intensity	+
Coordinated development of agriculture	Agricultural GDP per unit area	+
	Government support for agriculture	+
	Rural Engel coefficient	-
	Consumption level of rural residents	+
	Agricultural industrial structure adjustment index	+
Green agricultural development	Fertilizer use per unit area	-
	Pesticide use per unit area	-
	Usage of agricultural film per unit area	-
	land area covered with trees	+
Agricultural development is open	Export dependence of agricultural products	+
	Import dependence of agricultural products	+
Agricultural development is shared	Income ratio of urban and rural residents	+
	Per capita disposable income of rural residents	+
	Living standards of rural residents	+
	The gap between urban and rural consumption	-

Table 2. Evaluation index system for the digital economy

Digital infrastructure	Length of long distance optical cable per unit area	+
	Mobile phone penetration	+
	Number of Internet access ports	+
	Number of IPV4	+
Digital industrialization	E-commerce transaction volume	+
	Software revenue	+
	Number of information-based enterprises	+
	Number of websites per 100 enterprises	+
	The proportion of enterprises with e-commerce transactions	+
Industrial digitization	Digital finance coverage index	+
	Digital finance usage depth index	+
	The degree of digital finance digitization	+

4. Research Methods and Data Sources

4.1 Research Methods

The coupling coordination degree model is used to evaluate the coordinated development between multiple systems. This paper will utilize this model to explore the interaction and coupling coordination level between high-quality agricultural development and digital economy in six provinces of central China. Referring to the formula proposed by Wu Rulian (2023).

$$C = 2\sqrt{\frac{U_1 \times U_2}{(U_1 + U_2)^2}}$$

$$D = \sqrt{C \times T}$$

$$T = a \times U_1 + b \times U_2$$

Among them: U_1 and U_2 respectively represent the comprehensive index of high-quality agricultural development and the comprehensive index of digital economic development; C represents the coupling degree, reflecting the strength of the interaction between the two systems of high-quality agricultural development and the digital economy. D represents the coupling coordination degree, reflecting the quality of the coordination between the two systems of high-quality agricultural development and the digital economy. The value range of both is from 0 to 1. T is the comprehensive harmonization index of U_1 and U_2, reflecting the comprehensive effect of the interaction between these two systems. a and b are harmonic coefficients, and their sum is 1. Given that the high-quality development of agriculture and the digital economy are equally important and there is no obvious distinction between them, the same value, 0.5, is assigned to both a and b.

Referring to the classification of coupling degree and coupling coordination level by Zhang Haipeng et al. (2020) and Wang Shujia et al. (2021), we use the "four-point method" to divide the development types of high-quality agricultural development and digital economy coupling into four levels. We also use the "ten-point method" to divide the development types of coupling coordination into ten levels, with each level being 0.1 apart from the next. The specific details are shown in the following two tables.

Table 3. Evaluation criteria of coupling degree

Range of coupling degree C value	Coupling development stage
(0,0.3]	Low level coupling inversion phase
(0.3,0.5]	Antagonistic development stage
(0.5,0.8]	The development stage of friction
(0.8,1]	High level of coupling development stage

Table 4. Evaluation criteria of coupling coordination

Range of coupling coordination D value	Coordinate level evaluation
[0,0.1)	Extreme dislocation
[0.1,0.2)	major maladjustment
[0.2,0.3)	Moderate disorientation
[0.3,0.4)	Mildly disordered
[0.4,0.5)	Near to disorder
[0.5,0.6)	It was barely manageable
[0.6,0.7)	Primary coordination
[0.7,0.8)	Intermediate coordination
[0.8,0.9)	Good coordination
[0.9,1]	Quality coordination

4.2 Data Sources

The data for the Comprehensive Index of High-Quality Agricultural Development and the Comprehensive Index of Digital Economy mainly comes from the Digital Finance Research Center of Peking University, the China Rural Statistical Yearbook, the China Industrial Statistical Yearbook, the National Bureau of Statistics, and statistical yearbooks of various provinces over the years. For missing parts in the data, linear interpolation is used to fill in the gaps.

5. Analysis of the Coupling Degree and Coordination Degree

5.1 Development Index Measurement Analysis

5.1.1 Analysis of comprehensive index of high-quality agricultural development

Based on the comprehensive evaluation model, the comprehensive index of agricultural high-quality development in six provinces in central China from 2011 to 2022 was calculated by using entropy value method. The results are shown in Table 5.

Table 5. Comprehensive score for High-Quality Agricultural development

year	Shanxi	Anhui	Jiangxi	Henan	Hubei	Hunan
2011	0.165	0.294	0.294	0.216	0.270	0.264
2012	0.197	0.327	0.332	0.224	0.279	0.279
2013	0.234	0.360	0.325	0.248	0.326	0.312
2014	0.255	0.376	0.364	0.271	0.361	0.344
2015	0.255	0.406	0.375	0.304	0.393	0.384
2016	0.259	0.481	0.402	0.315	0.433	0.423
2017	0.247	0.499	0.424	0.354	0.472	0.467
2018	0.271	0.550	0.448	0.373	0.516	0.519
2019	0.290	0.586	0.486	0.408	0.557	0.575
2020	0.296	0.657	0.531	0.417	0.548	0.633
2021	0.305	0.726	0.583	0.476	0.625	0.695
2022	0.313	0.744	0.613	0.526	0.685	0.742
mean	0.257	0.501	0.431	0.344	0.455	0.470

As shown in Table 5, over the twelve years from 2011 to 2022, the comprehensive index of high-quality agricultural development in six provinces in the central region exhibited different trends. Overall, the composite index of each province increased year by year, indicating a continuous improvement in the level of high-quality agricultural development. The mean analysis of the comprehensive index of high-quality agricultural development in the six provinces of the central region shows that the means for Shanxi, Anhui, Jiangxi, Henan, Hubei, and Hunan are 0.257, 0.501, 0.431, 0.344, 0.455, and 0.470, respectively. In terms of the means, Anhui and Hunan have higher comprehensive indices for high-quality agricultural development, while Shanxi and Henan are relatively lower. Anhui and Hunan have high levels of mechanization, good ecological environments, and high contributions from agricultural technological progress, continuously improving the quality and efficiency of agricultural production. In contrast, Shanxi and Henan still face issues such as a lack of agricultural technological innovation and low agricultural productivity, which hinder the improvement of agricultural production quality.

In terms of the growth rate of high-quality agricultural development, Shanxi Province showed a steady growth trend from 2011 to 2015, with an accelerated growth rate from 2016 to 2018. However, due to increased resource and environmental pressures and untimely adjustments in agricultural structure, the growth rate slowed down from 2019 to 2022. Jiangxi Province and Anhui Province exhibited similar trends in their growth rates, maintaining steady growth from 2011 to 2016. From 2017 to 2022, both provinces vigorously developed agriculture and promoted industrial transformation and upgrading, leading to a faster increase in the level of high-quality agricultural development. Hunan Province and Hubei Province showed similar growth trends, with rapid growth from 2011 to 2016 as local governments implemented adjustments in the agricultural industrial structure and promoted modern agricultural technologies and management practices. The growth rate then slowed down from 2017 to 2022.

5.1.2 Analysis of Comprehensive Index of Digital Economy Development

Based on the comprehensive evaluation model, the comprehensive index of digital economy development in six provinces in central China from 2011 to 2022 was calculated by using entropy value method. The results are shown in Table 6.

Table 6. Comprehensive score of Digital Economy development

year	Shanxi	Anhui	Jiangxi	Henan	Hubei	Hunan
2011	0.040	0.111	0.084	0.154	0.160	0.150
2012	0.077	0.169	0.130	0.217	0.227	0.212
2013	0.113	0.217	0.171	0.278	0.310	0.260
2014	0.142	0.271	0.209	0.326	0.360	0.301
2015	0.182	0.347	0.272	0.396	0.433	0.351
2016	0.210	0.392	0.278	0.451	0.507	0.390
2017	0.229	0.450	0.346	0.478	0.558	0.430
2018	0.261	0.516	0.387	0.513	0.615	0.488
2019	0.275	0.575	0.424	0.519	0.679	0.517
2020	0.293	0.609	0.468	0.536	0.693	0.590
2021	0.330	0.668	0.513	0.588	0.754	0.652
2022	0.365	0.723	0.547	0.641	0.809	0.717
mean	0.210	0.421	0.319	0.425	0.509	0.422

As shown in Table 6, over the twelve years from 2011 to 2022, the comprehensive index of digital economy development in the six provinces of Central China exhibited different trends. Overall, the comprehensive index of each province increased year by year, indicating a continuous improvement in the level of digital economy development. After 2011, the six provinces in Central China successively introduced a series of policies to support the development of the digital economy, such as increasing infrastructure construction and optimizing the environment for innovation and entrepreneurship, providing a favorable policy environment for digital economy development. The mean analysis of the comprehensive index of digital economy development in the six provinces of Central China shows that the means for Shanxi, Anhui, Jiangxi, Henan, Hubei, and Hunan are 0.210, 0.421, 0.319, 0.425, 0.509, and 0.422, respectively. Among these, Hunan has the highest comprehensive index of digital economy development at 0.509, while Anhui, Henan, and Hunan have similar levels, all around 0.42.

In terms of the growth rate of the digital economy, Anhui Province saw a steady increase in its comprehensive index from 2011 to 2017, with a relatively fast growth rate, rising from 0.111 in 2011 to 0.723 in 2022. From 2018 to 2020, the growth rate slowed down, but from 2021 to 2022, the government attracted substantial investment, providing financial support for the development of the digital economy, which led to another acceleration in growth. Hubei Province experienced a steady increase in its comprehensive index from 2011 to 2018, but the growth rate slowed during 2019 to 2022 due to the impact of the COVID-19 pandemic. Henan Province saw a steady increase in its comprehensive index from 2011 to 2019, and from 2020 to 2022, it intensified efforts to attract high-end talent, ensuring a solid talent base for the development of the digital economy, thus accelerating the growth rate.

5.2 Analysis of the Coupling Degree

Based on the coupling coordination model, the coupling degree of high-quality agricultural development and digital economy development in six provinces of central China from 2011 to 2022 was calculated, as shown in Table 7. The coupling degree C is a key indicator measuring the intensity of interaction between high-quality agricultural development and the digital economy; its value directly reflects the degree of mutual coupling between the two. Observing Table 7, overall, the mean coupling degree of the six provinces in central China all exceeded 0.90, with Hunan Province standing out particularly, achieving a mean coupling degree of 0.995. This data clearly indicates a strong positive correlation between agricultural development and the digital economy. With the vigorous development of the digital economy, high-quality agricultural development has also been significantly promoted. Further analysis over time shows that the variation in coupling degree among the six provinces in central China is relatively small, indicating they are in a relatively stable fluctuation range in terms of coupled development. This further confirms that high-quality agricultural development and the digital economy are at a high level of coupled development.

Table 7. Coupling degree of central region from 2011 to 2022

year	Shanxi	Anhui	Jiangxi	Henan	Hubei	Hunan
2011	0.790	0.892	0.830	0.986	0.966	0.962
2012	0.898	0.948	0.900	1.000	0.995	0.991
2013	0.938	0.969	0.951	0.998	1.000	0.996
2014	0.958	0.987	0.963	0.996	1.000	0.998
2015	0.986	0.997	0.987	0.991	0.999	0.999
2016	0.994	0.995	0.983	0.984	0.997	0.999
2017	0.999	0.999	0.995	0.989	0.996	0.999
2018	1.000	0.999	0.997	0.988	0.996	1.000
2019	1.000	1.000	0.998	0.993	0.995	0.999
2020	1.000	0.999	0.998	0.992	0.993	0.999
2021	0.999	0.999	0.998	0.994	0.996	0.999
2022	0.997	1.000	0.998	0.995	0.997	1.000
mean	0.963	0.982	0.967	0.992	0.994	0.995

5.3 Analysis of the Coupling and Coordination Degree

Based on the coupling coordination model mentioned above, the coupling coordination degree of high-quality agricultural development and digital economy development in six provinces of central China from 2011 to 2022 was calculated using formulas, as shown in Table 8. As indicated by Table 8, the overall coupling coordination degree of provinces in central China showed an upward trend from 2011 to 2022, indicating that the high-quality agricultural development and digital economy in these provinces are moving towards a more coordinated direction. In 2011, the coupling coordination degree ranged from 0.284 to 0.456, with the top three provinces in terms of coupling coordination degree being Hubei (0.456), Hunan (0.446), and Henan (0.427). The two provinces at the bottom were Jiangxi (0.396) and Shanxi (0.284), in that order. In 2022, the coupling coordination degree ranged from 0.581 to 0.863, with Hubei (0.863) maintaining its position as the top, Anhui (0.856) rising to second place, followed by Hunan (0.854), Jiangxi (0.761), and Shanxi (0.581) still ranking last. Compared to 2011, the ranking of coupling coordination degree in 2022 has changed, with Anhui's coupling coordination degree gradually surpassing other provinces, moving from fourth to second place, while Hunan and Henan have slightly declined in ranking. During the study period, Hubei's coupling coordination level has consistently led other provinces, demonstrating outstanding performance in digital technology innovation and strong economic strength. In contrast, the coupling coordination degree of Jiangxi and Shanxi is relatively low, which may be related to their limited natural resource conditions, insufficient agricultural digital application scenarios, and low levels of agricultural informatization. These two provinces should achieve a balance between high-quality agricultural development and the digital economy, promoting coordinated progress in both areas.

From the average coupling coordination degree of high-quality agricultural development and digital economy in central provinces, it can be seen that Anhui, Henan, Hubei, and Hunan provinces have a coupling coordination degree exceeding 0.6, ranging between 0.6 and 0.7, indicating an initial level of coordination. This suggests that these provinces have established a certain degree of coordination between high-quality agricultural development and the digital economy. Jiangxi's coupling coordination degree falls between 0.5 and 0.6, indicating a barely coordinated level, while Shanxi's coupling coordination degree is 0.470, approaching imbalance, reflecting weaker capabilities in the co-development of high-quality agricultural development and the digital economy compared to Shanxi and Jiangxi. Over time, most provinces in the central region maintain a certain level of coordination, showing relatively stable development levels between high-quality agricultural development and the digital economy. The coupling coordination degrees of Shanxi and Jiangxi provinces show an upward trend, with Shanxi improving from a moderately imbalanced state to a barely coordinated state, and Jiangxi transitioning from a mildly imbalanced state to a moderately coordinated state. A comprehensive analysis of these data reveals that there are certain differences in the coupling coordination development levels between high-quality agricultural development and the digital economy across provinces in the central region. Provinces with higher coupling coordination degrees tend to be located in more economically developed areas, while those with lower coupling coordination degrees are mostly situated in relatively less economically advanced regions. This indicates that economic development levels are a significant factor influencing coupling coordination degrees, suggesting that economically developed regions are more likely to achieve high-quality coordination between high-quality agricultural development and the digital economy.

Table 8. Coupling coordination degree of central region from 2011 to 2022

year	Shanxi	Anhui	Jiangxi	Henan	Hubei	Hunan
2011	0.284	0.425	0.396	0.427	0.456	0.446
2012	0.351	0.485	0.456	0.470	0.501	0.493
2013	0.404	0.529	0.486	0.512	0.564	0.534
2014	0.436	0.565	0.525	0.545	0.600	0.567
2015	0.464	0.612	0.565	0.589	0.642	0.606
2016	0.483	0.659	0.578	0.614	0.684	0.637
2017	0.488	0.689	0.619	0.641	0.717	0.669
2018	0.516	0.730	0.645	0.661	0.751	0.709
2019	0.531	0.762	0.673	0.678	0.784	0.738
2020	0.542	0.795	0.706	0.688	0.785	0.782
2021	0.564	0.835	0.739	0.727	0.829	0.821
2022	0.581	0.856	0.761	0.762	0.863	0.854
mean	0.470	0.662	0.596	0.610	0.681	0.655

6. Conclusion and Suggestions

6.1 Enhance the Application of Digital Technology in Agriculture

Digital technology, including the Internet of Things, big data, and artificial intelligence, is gradually revolutionizing traditional agricultural production models. Increase investment in network and digital infrastructure in rural areas to expand coverage, improve speed, and ensure stability. Strengthen the construction of emerging digital infrastructure with 5G, and AI as pillars, providing solid technical support for agricultural modernization. Accelerate road construction to ensure that the process of agricultural modernization is supported by robust infrastructure.

6.2 Promote the Digital Transformation of the Entire Agricultural Industry Chain

Continuously advance the "Internet" plan for agricultural products to reach urban markets, cultivate numerous core operators, and facilitate the digital transformation of upstream and downstream enterprises in the industrial chain. Plan production and operations precisely according to market demand. Expand online sales networks for agricultural products, promote cooperation mechanisms between large supermarkets, e-commerce platforms, and major production areas, standardize and develop emerging models such as live-streaming e-commerce, and organize promotional activities like the "Harvest Celebration Consumption Season." Promote the digital transformation of origin markets and processing and distribution enterprises, integrate intelligent facilities and equipment for cleaning, grading, quality testing, processing, packaging, and cold storage, and foster the development of modern, intelligent, and high-end processing and storage models.

6.3 Cultivate Digital Agriculture Talent and an Innovative Ecosystem

Talent is the key to promoting high-quality agricultural development in tandem with the digital economy. To achieve deep integration between agriculture and the digital economy, it is essential to nurture agricultural professionals with digital skills. Governments and educational institutions should collaborate on training programs to enhance the digital literacy of farmers and agricultural workers. Encourage tech professionals to delve into rural areas, providing technical guidance and consulting services to help farmers better understand and apply digital technologies. Additionally, establish an innovative ecosystem that attracts tech companies and startup teams to participate in the digital transformation of agriculture, driving high-quality agricultural development through the research and development of new technologies and products.

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