

Measurement of High-quality Development Level of China's Digital Countryside under the Background of Rural Revitalization

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Abstract

In view of the current development dilemma of rural areas, China has put forward the important strategic deployment of "Rural Revitalization", which is of great significance to promote the development of "agriculture, rural areas and farmers". The high-quality development of digital village can quickly promote the process of rural and agricultural modernization. It is an effective means to realize the strategy of Rural Revitalization. Based on the perspective of rural revitalization, this paper constructs a comprehensive evaluation index system for the high-quality development level of digital villages in China from three aspects: the development environment of digital villages, the use of digital village technology and the healthy and green development of digital villages. Using the entropy weight TOPSIS method, this paper comprehensively calculates the high-quality development level of digital villages in 30 provinces and cities in China in 2019. The results show that: horizontally, there are obvious differences in the development level of digital villages in various provinces. The development level of digital villages in the eastern region is better, followed by that in the central region. The development level of digital villages in most provinces and cities in the northeast and western regions is at a low level. From the east to the west, it presents a three-step distribution pattern from high to low; Overall, the development of digital villages in China is still at a low level, and most areas have great development potential.

Keywords

Rural Vitalization Digital Village; Rural Modernization; Entropy Weight Topsis Method.

1. Introduction

Today's world is experiencing the rapid development of informatization. The new information technology represented by blockchain technology, big data and 5G is becoming a new driving force for development. The digital economy has a reconstruction effect on the traditional economic development model, promoting economic growth and becoming an engine to promote the progress of productivity. Thanks to the development of high and new technologies such as digitization and informatization, Internet technology and real industry are gradually integrating, which has brought new opportunities for the development of digital countryside. According to the data of the white paper on the development of China's digital economy released by the China Institute of information and communications, in 2011, the overall scale of China's digital economy reached 9.49 trillion yuan, with an increasing trend year by year. In 2019, it reached 35.84 trillion yuan, accounting for 36.2% of GDP. The added value of digital agricultural economy accounted for 8.2% of the added value of the industry. The development potential of digital village is huge.

In the development process of today's digital economy, the development of digital village is also on the agenda. The high-quality development of digital village can quickly promote the process of rural and agricultural modernization. It is an effective means to realize the strategy of Rural

Revitalization. The CPC Central Committee and the State Council attach great importance to the development of digital villages and have formulated specific development goals and plans: by 2020, the construction of digital villages will make preliminary progress, the construction of rural Internet infrastructure will be improved, the Internet access rate of rural residents will be improved, and emerging services such as "Internet +" will quickly settle in the countryside, making informatization play an important role in the construction of rural modernization; By 2025, important achievements will be made in the construction of digital countryside, the gap between urban and rural digital construction will be significantly narrowed, the construction of network infrastructure and the popularization of high-quality network will make it easier for rural areas to receive information and participate in foreign exchanges, and the rural grass-roots governance system will tend to be modernized; By 2035, the construction of digital village will be further developed, the gap between urban and rural digital construction will be further narrowed, the application of information and digital equipment in agricultural production and rural life will greatly improve the production efficiency and villagers' living standards, rural governance will be effective, and modern and beautiful villages will be basically completed; By the middle of this century, the digital countryside will be fully completed, the countryside will be developed in an all-round way, and the Rural Revitalization Strategy will be achieved. In order to achieve this goal as soon as possible, the CPC Central Committee and the State Council issued the following documents. In 2018, the opinions of the CPC Central Committee and the State Council on the implementation of the Rural Revitalization strategy proposed to implement the digital village strategy and develop digital agriculture in the vast rural areas. In May 2019, the general office of the CPC Central Committee and the general office of the State Council issued the outline of digital village development strategy, taking digital village as an important means to realize rural revitalization, and proposed to accelerate the development of rural digitization, so as to drive the development speed of agricultural and rural modernization. In January, 2020, the first document of the No. 1 central document, the opinions of the CPC Central Committee and the State Council on grasping the key work in the field of "agriculture, rural areas and farmers" to ensure the realization of a well-off society in an all-round way as scheduled, proposed to carry out the national digital village pilot. In January 2020, the Ministry of agriculture and rural areas and the office of the central network security and Information Technology Commission issued the digital agriculture and rural development plan (2019-2025), which clearly arranged the tasks and objectives of promoting the construction of digital countryside. In July 2020, the central network information office, the Ministry of agriculture and rural areas and the national development and Reform Commission issued the notice on carrying out the national digital village pilot work to start the national digital village pilot work. It can be seen that the high-quality development of digital village can quickly promote the process of rural and agricultural modernization, and is an effective means to realize the Rural Revitalization Strategy.

At present, China's rural areas have been in a period of transformation and are developing in the direction of modernization. The combination of digital and information technology with agriculture and rural areas will significantly improve the efficiency of agricultural production, improve the ability of information exchange between rural and urban areas, and improve people's living standards. However, at present, the combination of digital economy with agriculture and rural areas in China is still at a low level. The development environment, human resources, information foundation, technology application and data sharing of rural digital economy are far from perfect. The integrated development of digital economy and rural areas is facing many difficulties. Moreover, from a national perspective, the development level of digital village is affected by economic, geographical, policy and other factors. Provinces and cities show great differences, and the construction of digital village still has a long way to go. Based on this, based on the previous research results, combined with the relevant knowledge

of rural agricultural modernization, digital economy and Rural Revitalization Strategy, this paper constructs a comprehensive evaluation index system for the high-quality development of digital villages in China, empirically analyzes the high-quality development level of digital villages in 30 provinces, municipalities and autonomous regions in 2019, discusses the factors affecting the development of digital villages, and puts forward some policy suggestions, In order to provide some strength for promoting the development of rural agricultural modernization and realizing rural revitalization.

2. Journals Reviewed

With the rapid development of digital economy in China in recent years, digital technology has also been applied in the traditional real economy. Digital village includes the digital development of rural and agriculture, and has become the carrier of the integration of digital economy and traditional real economy. As the basic industry of national development, the high-quality development of digital agriculture can significantly reduce production costs and information acquisition costs, increase industrial scale, improve industrial efficiency and expand industrial scale benefits. As a home for agricultural production and rural residents, the construction of digital village can make rural circulation services more convenient, the cultural industry develops rapidly, and the rural modern service system and grass-roots governance ability can be rapidly improved. The criterion of "people-oriented" in China requires to improve people's living standards, which is the due meaning of the Rural Revitalization Strategy.

In terms of digital agriculture, Zhang Zhen and others believe that although the development themes of various countries are different, the ultimate goal is to promote economic development, improve quality and efficiency, that is, comprehensively improve the quality of economic development; Li Yumo and Ren Baoping believe that when the economy grows to a certain volume, the new kinetic energy will replace the old kinetic energy, so as to realize the upgrading of the industrial structure; Wang Xiaohua, Zhang Ying and others believe that digital finance can enable high-quality agricultural development, but it is necessary to speed up the top-level design and strategic planning of digital finance development and the infrastructure construction of rural digital finance; Ruan Junhu, Liu Tianjun and others believe that the realization of agricultural digitization lies in the digital construction of agricultural infrastructure, the transparency of industrial chain transactions, and the independent decision-making of agricultural intelligent application; Gao Yu, Wang Wenqiang and others believe that digital agriculture is to apply digital technology to agriculture and use digital equipment to monitor, digitize and intelligently manage the process of agricultural production, storage and sales; Cao Xinyu, Tian Donglin and others believe that the high-quality development of digital agriculture lies in the organic integration of digital agriculture and intelligent agriculture. It is an agricultural production mode with open technology system, which is conducive to the standardized production and management of agriculture.

In terms of digital countryside, Gu Chenguang believes that policies, data and applications can promote the construction of digital countryside. However, at present, the construction of digital countryside still faces problems such as the effective integration of new technology and traditional agricultural production, the uneven income distribution of digital rural achievements, and the inability of effective exchange and circulation of digital rural achievements; Wu Yongwei believes that the rural infrastructure is weak, the application of wisdom is relatively small, and the talent gap is large. It is necessary to improve the digital rural information infrastructure and promote the digitization of industry, governance and services; Teng Huan and Li congcongcong believe that the construction of digital village is inseparable from the continuous participation of grass-roots people, and the rural intelligent governance system can be effectively constructed through the big data platform; Zhang Hong, Liu Xiuzheng

and others believe that rural e-commerce can effectively promote the construction of digital countryside through the combination with agriculture and service industry; Mei Yan and Lu Yuhui pointed out that China needs to establish a three-dimensional development model with farmers as the core and multi-party assistance by comparing and analyzing the digital village construction models of typical developed countries.

To sum up, the development of digital village based on Rural Revitalization Strategy has been widely discussed. However, the previous research on the development of digital village mostly stays in the qualitative research, while the evaluation index system of high-quality development of digital village is rarely constructed, and the empirical research is still insufficient. The innovation of this paper may lie in: by constructing the comprehensive evaluation index system of high-quality development of digital countryside, this paper calculates the development level of digital countryside in 30 provinces and cities in China in 2019, and tries to analyze its obstacles, in order to provide reference for Rural Revitalization.

3. Empirical Analysis

3.1. Selection of Evaluation Indicators

Based on the relevant indicators of China Digital Village Development Report (2019), and drawing on the achievements of predecessors in the fields of rural revitalization, rural agricultural modernization, digital economy and informatization, this paper constructs a comprehensive evaluation index system for the high-quality development of digital village from three aspects: the development environment of digital village, the technical application of digital village and the healthy and green development of digital village. First of all, the development environment is the basis for the high-quality development of digital countryside, including financial and educational expenditure, scientific and technological research, rural infrastructure, transportation, postal and other investment; Secondly, the application of digital technology is the propeller of the development of digital countryside, including the consumption expenditure of rural residents' transportation and communication, the use of agricultural machinery and agricultural digital equipment, the popularity of Internet and broadband, reflecting the ownership and use of rural digital equipment and the development of industries related to agricultural digital technology; Finally, the healthy and green development of rural areas is the guarantee of high-quality sustainable development of digital countryside and the due meaning of beautiful rural construction, including the use of pesticides and chemical fertilizers, the effective irrigation area of land and agricultural output value. Therefore, according to the principles of data availability, representativeness and scientificity, this paper selects 24 indicators from three levels to build a comprehensive evaluation index system for high-quality development of digital countryside.

3.2. Research Method

The methods used to determine the index weight have been widely studied in academia, such as entropy weight method, analytic hierarchy process, critical method, principal component analysis method, TOPSIS method, grey correlation method and so on, but they all have unavoidable shortcomings. The interpretation of the principal components extracted by principal component analysis is fuzzy, and it is necessary to ensure that the cumulative contribution rate of the first few principal components extracted reaches a certain level. Compared with principal component analysis, analytic hierarchy process improves objectivity, but when there are too many indicators at the decision-making level, it will cause confusion in judgment, and scholars do not consider the rationality of judgment matrix. Because it is scored by experts, the assignment of judgment matrix is often arbitrary. Although entropy method can objectively reflect the weight of indicators, it can not reflect the gap between the development

level of the research object and the ideal level. Therefore, this paper adopts entropy weight TOPSIS method, which can not only avoid the excessive subjectivity of the traditional analytic hierarchy process, but also clearly see the gap between the current situation of digital village development in various regions and the ideal level. The calculation method is as follows:

First, standardize the index to eliminate the influence of index dimension. Let the sample size of the data set be n and the number of indicators be m , x_{ij} is the original value of index j of the i th sample, z_{ij} is the standardized value ($i = 1, 2, \dots, n$, $j = 1, 2, \dots, m$, n represents the number of samples, m represents the number of indicators)

For positive indicators:

$$z_{ij} = \frac{x_{ij} - \min\{x_{1j}, x_{2j}, \dots, x_{nj}\}}{\max\{x_{1j}, x_{2j}, \dots, x_{nj}\} - \min\{x_{1j}, x_{2j}, \dots, x_{nj}\}}$$

For reverse indicators:

$$z_{ij} = \frac{\max\{x_{1j}, x_{2j}, \dots, x_{nj}\} - x_{ij}}{\max\{x_{1j}, x_{2j}, \dots, x_{nj}\} - \min\{x_{1j}, x_{2j}, \dots, x_{nj}\}}$$

Second, calculate the weight of each index. Use the standardized values to perform the following operations.

Determine information entropy:

$$p_{ij} = \frac{z_{ij}}{\sum_{i=1}^n z_{ij}}$$

Determine index weight:

$$e_j = -\frac{1}{\ln n} \sum_{i=1}^n p_{ij} \ln p_{ij}$$

$$w_j = \frac{1 - e_j}{n - \sum_{j=1}^m e_j}$$

Build decision matrix:

$$V = w_i * x_{ij}$$

Determining positive ideal solution and negative ideal solution:

$$v^+ = \{\max V_{ij} | i = 1, 2, \dots, m\}$$

$$v^- = \{\min V_{ij} | i = 1, 2, \dots, m\}$$

Calculate the Euclidean distance, with D^+ and D^- respectively representing the distance between the actual development level and the ideal level of digital countryside in each region:

$$D^+ = \sqrt{\sum_{j=1}^m (V_{ij} - V_j^+)^2} \quad (i = 1, 2, \dots, n),$$

$$D^- = \sqrt{\sum_{j=1}^m (V_{ij} - V_j^-)^2} \quad (i = 1, 2, \dots, n)$$

Calculate closeness C_j

$$C_j = \frac{D^-}{D^- + D^+}$$

C_j is the closeness degree, which indicates the closeness between the evaluation object and the ideal scheme, the value of C_j is obviously between (0,1), when the closer C_j is to 0, the farther the evaluation object is from the positive ideal solution, the lower its development level, and its development status needs to be improved; When the closer C_j is to 1, the closer the evaluation object is to the positive ideal solution, and the higher its development level is. Based on the existing research of relevant scholars, the fit degree of the high-quality development level of digital villages in 30 provinces, municipalities and autonomous regions of China is divided as follows:

Table 1. Classification of digital rural development level

| level | 1 | 2 | 3 | 4 | 5 |
|-----------|---------|-----------|-----------|-----------|-----------|
| Closeness | (0,0.2) | (0.2,0.4) | (0.4,0.6) | (0.6,0.8) | (0.8,1.0) |

3.3. Data Sources

This paper selects the relevant data of 30 provinces, municipalities and autonomous regions of China (Hong Kong, Macao, Taiwan and Tibet are excluded due to lack of data) in 2019. The data are mainly from 2019 China Statistical Yearbook, 2018 China Statistical Yearbook, 2019 China Rural Statistical Yearbook, 2018 China population and Employment Statistical Yearbook, regional government bulletins and relevant network resources. Some missing data are supplemented by interpolation.

4. Empirical Analysis

4.1. Measurement of Digital Village Development Level

The entropy weight TOPSIS method is used to calculate the comprehensive evaluation results of digital rural development in 30 provinces, municipalities and autonomous regions of China in 2019, as shown in the table below.

Table 2. Topsis comprehensive score results

| | D ⁺ | D ⁻ | Relative proximity | Result |
|---------------|----------------|----------------|--------------------|--------|
| Bei Jing | 0.22 | 0.047 | 0.176 | 22 |
| Tian Jin | 0.229 | 0.029 | 0.111 | 27 |
| He Bei | 0.187 | 0.093 | 0.333 | 10 |
| Shan Xi | 0.215 | 0.041 | 0.159 | 25 |
| Nei Menggu | 0.216 | 0.047 | 0.18 | 21 |
| Liao Ning | 0.21 | 0.042 | 0.168 | 24 |
| Ji Lin | 0.214 | 0.036 | 0.143 | 26 |
| Hei Longjiang | 0.209 | 0.063 | 0.232 | 17 |
| Shang Hai | 0.212 | 0.062 | 0.226 | 18 |

| | | | | |
|------------|-------|-------|-------|----|
| Jiang Su | 0.154 | 0.139 | 0.476 | 3 |
| Zhe Jiang | 0.152 | 0.105 | 0.408 | 7 |
| An Hui | 0.187 | 0.071 | 0.273 | 13 |
| Fu Jian | 0.149 | 0.106 | 0.417 | 5 |
| Jiang Xi | 0.178 | 0.066 | 0.27 | 14 |
| Shan Dong | 0.176 | 0.122 | 0.409 | 6 |
| He Nan | 0.182 | 0.105 | 0.366 | 9 |
| Hu Bei | 0.175 | 0.073 | 0.295 | 11 |
| Hu Nan | 0.152 | 0.1 | 0.397 | 8 |
| Guang Dong | 0.099 | 0.171 | 0.634 | 1 |
| Guang Xi | 0.179 | 0.069 | 0.277 | 12 |
| Hai Nan | 0.227 | 0.02 | 0.08 | 30 |
| Chong Qing | 0.202 | 0.042 | 0.172 | 23 |
| Si Chuan | 0.127 | 0.162 | 0.561 | 2 |
| Gui Zhou | 0.189 | 0.06 | 0.242 | 16 |
| Yun Nan | 0.164 | 0.126 | 0.434 | 4 |
| Shan Xi | 0.198 | 0.054 | 0.214 | 19 |
| Gan Su | 0.2 | 0.052 | 0.206 | 20 |
| Qing Hai | 0.224 | 0.028 | 0.11 | 28 |
| Ning Xia | 0.232 | 0.023 | 0.09 | 29 |
| Xin Jiang | 0.199 | 0.07 | 0.259 | 15 |

4.2. Result Analysis

4.2.1. Evaluation Results of Digital Rural Development

Considering that the establishment of digital village evaluation index system is a complex process, this paper adopts entropy weight TOPSIS comprehensive evaluation model, calculates 24 indexes of 30 provinces, municipalities and autonomous regions by using standardized data, and obtains the comprehensive evaluation score of high-quality development level of digital village in each region.

Through horizontal comparison, it can be seen that in 2019, Guangdong Province has the highest development level of digital countryside in all provinces and cities, followed by Sichuan Province, Jiangsu Province and Zhejiang Province, and Ningxia and Hainan Province have the lowest development level. The higher level of digital village development is mainly concentrated in the eastern and central regions, including Shandong Province, Henan Province, Anhui Province, Jiangxi Province, Hunan Province, Hubei Province, Fujian Province, Hebei Province, Guangdong Province, Jiangsu Province, Zhejiang Province, Sichuan Province, etc. the development level of digital village in the Eastern region is significantly higher than that in the northeast, central and western regions, ranking first comprehensively. The development level of digital village in the central region only lags behind that in the eastern region, In the second place, the development level of digital countryside in the western region is backward as a whole. Only Sichuan has a high development level of digital countryside, and the development of digital countryside in Gansu, Ningxia, Shanxi, Qinghai and other places is at a low level, which has a certain relationship with the local economic situation. Due to geographical factors, history, culture and other reasons, the economy of the western region has been at a backward level. The government should strengthen policy support for science and technology, education, transportation and post and telecommunications in the western region to ensure that the western region still has an environmental atmosphere for the development of digital countryside. The development of digital countryside in the eastern region is at the leading level in the country, thanks to the geographical factors and policy support of the eastern region. As a coastal city, with the reform and opening up, the eastern region has been inclined by many

policy resources, and the influx of talents and resources has made its development speed thousands of miles with each passing day, and its development level is far higher than that of other regions. Comparing the eastern, northeast, central and western regions, it is found that the "digital divide" still exists. The government should introduce targeted policies to pay attention to the cultivation of digital agricultural talents, the introduction of digital talents, financial and educational expenditure, infrastructure investment, transportation, post and telecommunications investment in the central, Western and northeast regions, so as to improve the technical and cultural level of rural residents, so as to speed up the construction of digital villages in backward areas. For the areas with the leading development level of digital village in the East, we should pay attention to the cultivation and roots of digital talents, continue to increase capital investment, broaden the development mode of rural digital economy, pay attention to rural green governance, rural modernization and grass-roots management modernization, pay attention to environmental protection, and realize the transformation of digital village from high-speed development to high-quality development as soon as possible.

By observing the overall development level of digital countryside in China, it is obvious that most regions are at a backward level. Even the leading eastern region still has a limited development level, and there is still a gap between the current development situation of digital countryside in the eastern region and the ideal state. Therefore, at this stage, China still needs to formulate a reasonable long-term plan and continuously increase the investment level in rural development, In order to achieve the strategic goal of Rural Revitalization as soon as possible.

4.2.2. Spatial Difference Analysis of Digital Village Development Level

In order to more clearly show the spatial distribution differences of provinces, municipalities and autonomous regions, according to the classification of digital village development level in Table 2, the high-quality development level of digital village in 30 provinces, municipalities and autonomous regions in China is clustered as follows.

Table 3. Hierarchical clustering distribution

| Level | |
|-------|---|
| 1 | Bei Jing /Tian Jin /Shan Xi /Nei Meng/Liao Ning /Ji Lin /Hai Nan /Chong Qing/ Qing Hai /Ning Xia |
| 2 | He Bei/Hei Longjiang/ Shang Hai /An Hui/ Jiang Xi /He Nan/ Hu Bei/ Hu Nan/Guang Xi/ Gui Zho/ Shan Xi/ Gan Su/ Xin Jiang |
| 3 | Jiang Su /Zhe Jian /Fu Jia/n Shan Dong/ Yun Nan |
| 4 | Guang Dong/ Si Chuan |
| 5 | empty |

It can be seen that the spatial distribution of the development level of digital countryside in China is basically a three-step distribution state of East, middle and West. There are seven provinces with better development level of digital countryside, including five in the eastern region, namely Guangdong Province, Jiangsu Province, Zhejiang Province, Fujian Province and Shandong Province. The poor level of digital village development is mainly concentrated in the northeast and western regions. Among them, nearly 2 / 3 of the provinces in the western region are at a poor level of digital village development, and on the whole, the digital village development of most provinces, municipalities and autonomous regions in China is also at a low level. Therefore, due to better economic development and rich resources, the eastern region is easier to form the large-scale, standardized and systematic development of digital industry than other regions, and has certain first mover advantages. The development level of digital villages in most central provinces also lags behind that in eastern coastal provinces,

indicating that the central region also pays more attention to the digital and modern development of villages. The western region temporarily lags behind the national average due to geographical and other factors. However, with the promotion of the western rise strategy and the continuous attention of the state to the western region in recent years, the western region will make great progress in the development of rural digitization and modernization in the future.

5. Conclusion and Suggestions

5.1. Conclusion

By constructing a comprehensive evaluation index system for the high-quality development of digital villages, this paper systematically calculates the development level of digital villages in 30 provinces, municipalities and autonomous regions in China in 2019, and analyzes the degree of differences in the development of digital villages among provinces. The main conclusions are as follows: the overall development level of digital countryside in China is not high and needs to be further developed. There are great differences in the development level of digital villages among provinces. The development level of digital villages in the eastern region is good, the development level of digital villages in the central region tends to be good, and the development level of digital villages in the northeast and western regions is generally backward, forming a three-level ladder distribution from the east to the middle to the West. The phenomenon of "digital divide" is obvious. Except the East, other regions are at a backward level in infrastructure, talent training and recruitment, industrial scale, enterprise settlement, government investment and policy support due to economic, geographical and historical reasons. There is still a large gap between the development level of digital villages in the West and northeast and the national average level.

Therefore, all regions, especially the western and northeast regions, should seize the digital opportunity, with the concerted efforts of the government, enterprises and farmers, and starting from the local reality, issue targeted suggestions and measures, give priority to the development of advantageous industries and pay attention to making up for the shortcomings, so as to catch up with and surpass the advantageous regions.

5.2. Suggestions

First, in terms of digital village development environment, we should speed up the construction of rural network infrastructure, vigorously support the development of rural digital economy, improve the level of rural agricultural scientific and technological innovation, and promote the integrated development of urban and rural informatization. In China, the countryside is not only the place where the majority of farmers live, but also the place where the popularization rate of modern facilities is low. In turn, the low investment in rural digital development inhibits the process of rural digital development. Therefore, it needs the support of various policies, funds and human resources.

Second, in the aspect of digital rural governance, we should pay attention to the sustainable development of rural areas, improve the popularity of rural networks, enhance the modernization ability of rural grass-roots governance, and stimulate the driving force of rural areas. Reduce the use of chemical fertilizers and pesticides, promote the establishment of green ecological parks, comprehensively collect and manage real-time data of agriculture, forestry, animal husbandry and fishery, establish a monitoring platform, effectively deal with rural pollutants and domestic waste, and guide rural residents to form awareness of environmental protection; Use the Internet to publicize digital information and promote the construction of multimedia services at the county level.

Third, in terms of digital village talent training, we should give full play to the role of colleges and universities, educational institutions and enterprises, accelerate the training of a number of digital scientific and technological talents, train new farmers, and improve the ability of rural agriculture to absorb digital talents. The construction of modern and digital countryside is inseparable from the participation of farmers. Only the organic integration of digital equipment and farmers can give full play to the maximum role of equipment. Therefore, in order to improve the digital development level of rural areas, we must improve the ability of rural residents to master digital equipment and digital information, and cultivate rural residents with internet thinking.

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