Research on the Current Situation and Countermeasures of Agricultural Informatization Construction in Plain Region

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ABSTRACT

The purpose of this study is to promote the development of agricultural informatization. The "Internet+agriculture" mode helps to integrate rural industries and solve agricultural and rural problems. Through the investigation of the current situation of agricultural informatization in plain areas, this study analyzed the gap in the development of agricultural informatization in plain areas and put forward practical ideas to speed up the process of agricultural informatization in plain areas. The research method involves taking informatization as system engineering and investigating the economic infrastructure, software/hardware, government support, and user proficiency. It uses empirical data from the perspective of supply and demand to assess the progress of informatization. The main result is that there are still key defects in plain areas. The government should actively guide stakeholders to ensure that the mobile Internet optimizes agricultural production, management, and services.

Keywords: Agricultural Internet; Information-based agriculture; Farmers and rural agricultural issues

1. Introduction

Previous studies have pointed out the problems of weak infrastructure and lack of effective integration and development of information resources in agricultural informatization. The research direction of agricultural informatization is highly subjective and in a spontaneous and disordered state. The research direction is arbitrary, the purpose is not clear, and is out of line with the actual situation, which leads to the research direction being inconsistent with the market development trend and increases the difficulty of promoting informatization in the agricultural industry. The practicability of agricultural informatization must be improved.

The research focus of this paper is to introduce agricultural informatization, discuss how to use the mobile Internet of things as the core to build a service system, accelerate information integration and avoid resource waste, promote the application of the Internet of Things, strengthen database construction, simplify the construction process, and share the informatization achievements; let us

know what agricultural informatization is and its general application scope; analyze the development status of agricultural informatization through the analysis of government documents and agricultural informatization development forms; and understand the current situation of agricultural informatization development in plain areas [1].

1.1 Background and Research Significance of the Topic Selection

Currently, agricultural informatization is flourishing, and the entry of agricultural information into villages and households is still the main bottleneck restricting the construction of informatization. To this end, the country has invested a large amount of manpower, financial resources, and material resources in order to effectively integrate information resources. Based on an actual investigation of the development of agricultural informatization in the plain region, this study combines my own study and practical work experience [2][3]. After reading a large amount of literature, I analyzed and summarized the relevant suggestions, hoping to provide favorable references for further promoting agricultural informatization in the plain region.

1.2 The Important Role of Agricultural Informatization in Agricultural Development

Agricultural informatization is the only way to solve farmers' problems and to promote rural development. In response to the current situation of low cultural level, dependence on traditional experience, and insufficient acceptance of new technologies among farmers, the development of agricultural informatization can accelerate rural social development and enhance the cultural level of farmers; optimize the efficiency of agricultural resource allocation and improve the resource utilization rate; promote the deep integration of agriculture, scientific research, and education; and create more employment opportunities and business models [4], as well as the core driving force for achieving sustainable agricultural development, assisting in the scientific and efficient production of agriculture, and meeting the requirements of the scientific development concept.

2. Investigation and Implementation Status of Agricultural Informatization Construction in Plain Region

2.1 Investigation Method

To further understand the construction of new rural areas and the development of modern agriculture in the plain region, the following survey methods were adopted.

(1) Household surveys, face-to-face interviews, group meetings, and on-site observations.

(2) The Hotline Center of the Agricultural Commission Information Center conducted a one-on-one questionnaire survey of randomly selected farmers within the province.

(3) Using WeChat public and Moments, we sent out a voting invitation on the WeChat public platform, which was forwarded by friends and Moments and received nearly a thousand votes.

2.2 Data Processing and Analysis

Data processing and analysis used manual collection and computer processing. Conduct satellite measurements of the product's geographical scope, collect cultural history through various records, and finally input the data into Excel spreadsheets and Word documents. At the same time, collect

statistical data from various districts, cities, and counties, input the data, and use electronic spreadsheets for preliminary processing, mainly using computer programs for calculation and analysis. The development status of agricultural informatization in Plain region was studied through comparative analysis and group analysis.

2.2.1 Research report on new rural areas going to the countryside

Time: July 20, 2024 to February 7, 2025;

Location: Plain region;

Sample size: 1233 valid farmer questionnaires and 125 valid village level questionnaires;

(1) Background of the investigation: In order to gain a deeper understanding of the status of agricultural informatization construction in Plain region, provide strong data basis for the construction of new rural areas, and promote the good and rapid development of rural construction, a special research was conducted on the relationship between new rural construction and modern agricultural development. The survey adopts a stratified sampling method to investigate various levels of rural society, and conducts research in five major regions of the Plain region.

(2) Survey results: This survey includes economic regions with different situations in Plain region (see Table 1), involving various professions in rural society (see Table 2). In this survey, 75% of farmers have other non-agricultural labor, but only 44% of them rely on non-agricultural activities as their main source of livelihood, while the other 25% mainly rely on agricultural production for their livelihood.

Table 1. Main Composition of Samples

area	Economically advantageous position	General area	Economically disadvantaged areas
Number of samples	230	841	287
percentage	17%	62%	21%

Table 2. Survey Object Status

gender	Number of people	age group	Number of people	degree of education	Number of people	career	Number of people	income	Number of people
						Family farming	413		
		Under 25	33	Primary school	214	individual operation	218	Below 5000	158

		years old		and below			yuan	
male	1018					Private property owners	135		
		26 to 40 years old	704	junior high school	854	Grassroots cadres	178	0.5-20000 yuan	769
						Livestock professional households	165		
female	340	41-50 years old	530	high school	245	Planting professional households	76	20000 to 40000	309
						Migrant workers	124		
		51 years old and above	91	College degree or above	45	other	49	Over 40000 yuan	122
amount to	1358		1358		1358		1358		1358

This survey also involves how the respondents usually obtain information. (See Table 3)

Table 3. Ways in which respondents obtain information

Information channels	internet	television	Market Communication	Agricultural technicians	Newspapers and magazines	radio station	Family and friends introduction
farmer	1	45		24	39	48	18
Village officials	5	84	8	30	86	82	62

self-employed person	12	55	9	12	45	34	35
Township enterprise personnel	19	80	23		82	75	16
Marketing personnel	15	44	2	8	83	78	10
Information Officer	2	39	7		6		
amount to	54	347	49	74	341	317	141
Rate	13.5%	86.75%	12.25%	18.5%	85.25%	79.25%	35.25%

We also conducted a survey on the needs of the respondents, involving the types of information needed. (See Table 4).

Table 4. Types of Information Needed by Respondents

Information demand	agricultural policy	Technological knowledge	Agricultural inputs market	Labor demand	training and education	Meteorological and agricultural conditions
farmer	22	78	45	52		32
Village officials	42	76	66	46	9	53
self-employed person	24	30	15	5	18	18
Township enterprise personnel	76	54	5	6	39	
administrative personnel	43	73	16	15	12	24
Marketing personnel	9	18	28			9
Information Officer	4	7	6			7
amount to	207	335	175	112	78	145
Rate	51.75%	83.75%	43.75	30.5%	19.5%	36.25%

The survey data shows that individual business owners are more concerned about the application

of information, with farmers being the lowest. People over 50 years old have a low desire for new technologies and a lower level of education. The proactive learning ability of village cadres needs to be improved.

2.2.2 Hotline investigation and analysis report

Time: February 19, 2025 to March 17, 2025;

Location: Mainly centered around Plain region;

Sample size: 2000 valid farmer questionnaires;

(1) Background of the investigation: In order to analyze the current situation of agricultural informatization in a targeted manner and better grasp the demand situation, the investigation team designed an agricultural informatization demand survey questionnaire. The survey questions were designed from the aspects of production, operation, life, education, healthcare, finance, employment, insurance, culture, marriage, legal services, etc. The hotline was used to randomly survey farmers within the province.

(2) Survey results

19% of farmers in the village have professional agricultural machinery services, of which 48% of farmers are satisfied with the services (see Figure 1).

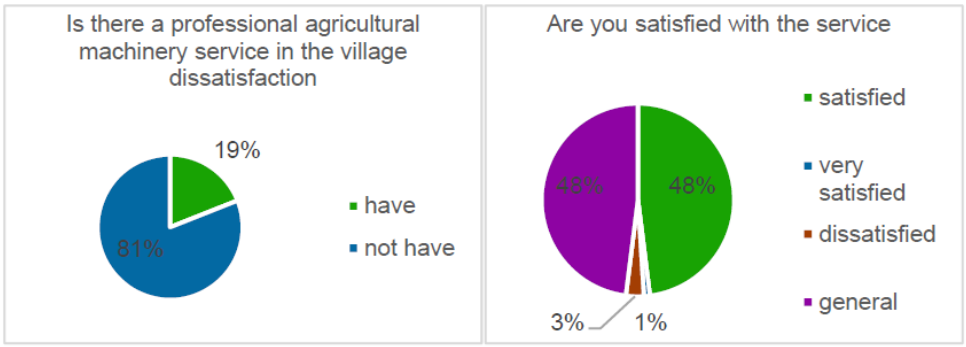


Figure 1. Agricultural Machinery Service Situation

16% of surveyed farmers have participated in agricultural production training, and 65% of clothing farmers are satisfied with the service (see Figure 2).

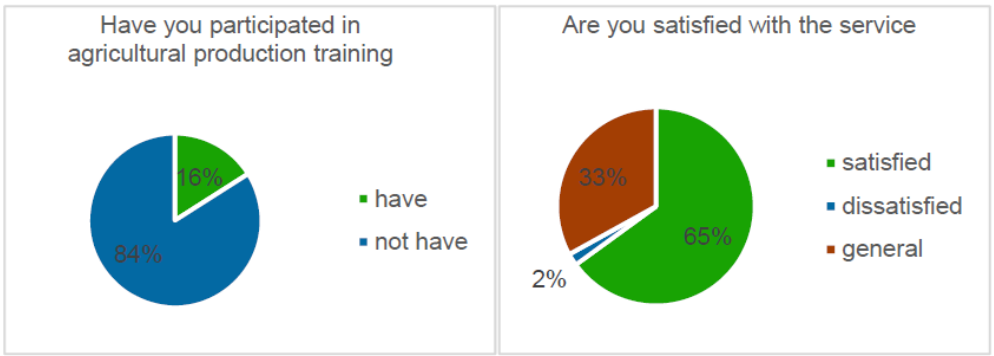
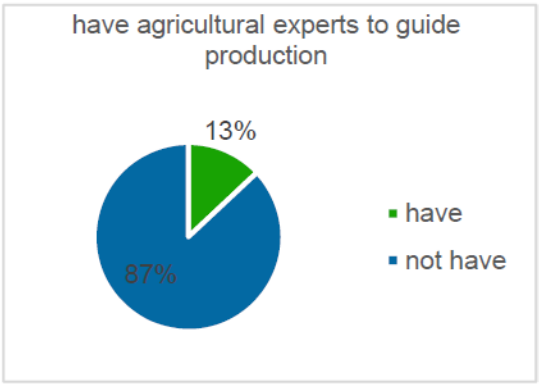


Figure 2. Agricultural Production Training Service Situation

13% of surveyed households have agricultural technology extension experts guiding production in their villages (see Figure 3).

19% of surveyed farmers in the village are aware of the Hotline, while few in the village are

aware of (see Figure 4).



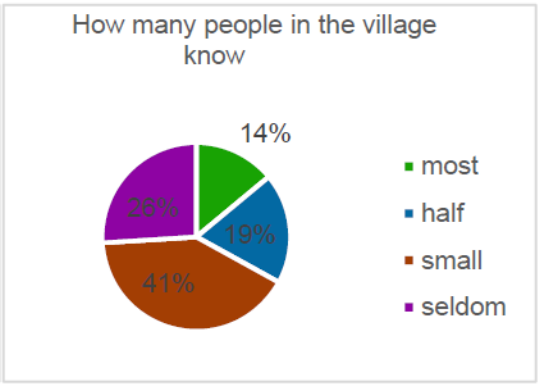
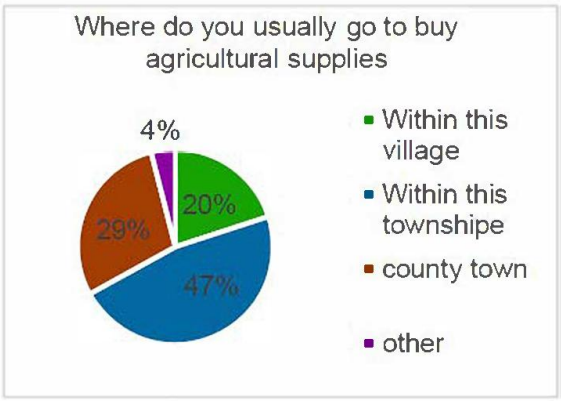


Figure 3. Status of Agricultural Technology Guidance Services Figure 4. Survey on the Popularization of hotline

Most surveyed farmers purchase the necessary agricultural materials within their own village or township, with only 38% of households expressing confidence in the purchased agricultural materials (see Figures 5 and Figures 6).



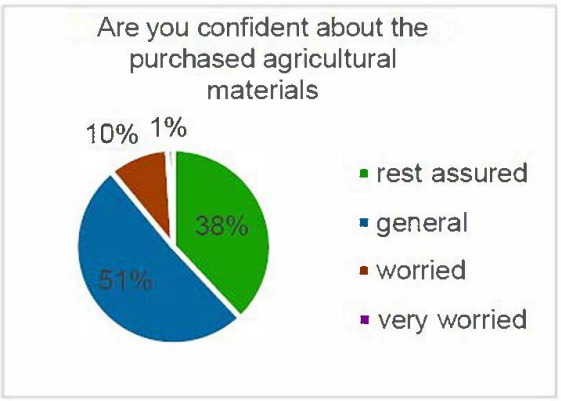


Figure 5. Survey of Farmers' Purchase Locations for Agricultural Materials Figure 6. Survey of Farmers' Confidence in Agricultural Materials

Nearly half of the surveyed households have livestock and poultry epidemic prevention services in their villages (see Figure 7).

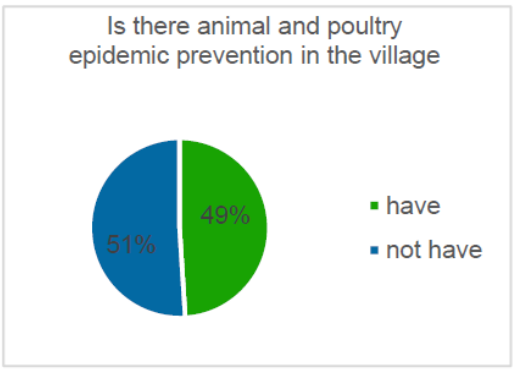


Figure 7. Epidemic Prevention Services for Livestock and Poultry

2.2.3 Wechat voting survey analysis report

Time: March 1, 2025 to April 1, 2025;

Location: WeChat official account, circle of friends;

Sample size: Nearly a thousand people voted, with a total of 6804 votes;

(1) Background of the investigation: During the investigation, the research team found that farmers are currently facing several difficulties (compared to urban areas), including difficulties in livelihood, education, development, food sales, loans, farming, employment, and romantic relationships. The vast majority of these problems are caused by the lack of access to information in rural areas. In order to obtain the most pressing problems that farmers need to solve, the survey launched a WeChat poll titled "Finding the Starting Point: What Difficulties Farmers Face".

(2) Survey results

According to the voting results (see Table 5), the top priority is the difficulty in improving people's livelihoods, followed by difficulties in education. The third priority is the difficulty in development, while the fourth and fifth priority is the difficulty in selling and paying for goods.

Table 5. WeChat Survey Results

Sorting/Problem	difficult problem	result
1	Difficulty in improving people's livelihoods (medical treatment and elderly care)	1746
2	Reading is difficult	916
3	Difficulty in development	877
4	Difficulty in selling grain	783
5	Difficulty in obtaining loans	769
6	Difficulty in farming	673
7	Difficult to work	629
8	Love is difficult	301
9	other	110

3. The current situation and existing problems of agricultural informatization construction in Plain region

3.1 Current Status of Agricultural Informatization Development in Plain region

3.1.1 Comprehensive information service system

Since last year, Plain Agricultural Information Network has been upgraded and renovated. The daily click through rate is over 20000 times. The Plain Agricultural Information Network has been rated as one of the top 100 agricultural websites and awarded the Excellent Group Award by the Ministry of Agriculture for four consecutive years. Various regions have also established characteristic agricultural websites, such as "Plain Agricultural Information Network" and "Nanguo Pear Network", which are also quite influential [5].

3.1.2 The speed of network extension to the grassroots is accelerating

Now the basic daily necessities such as radio, telephone and television have entered most families, and even computers have entered some families. With these infrastructures, the release of agricultural information has been significantly accelerated. As of last year, every village in the province can at least be connected to the Internet, and the mobile APP "Agriculture+" download of the Information Center of the Agricultural Commission has also exceeded 1 million, which has also made the network a great solution in the construction of agricultural informatization.

3.1.3 Agricultural informatization construction project progresses smoothly

Now, the integration of the three electricity systems in Plain region has been basically completed, but some websites are still under construction, and the government's finances still need to increase investment. The successful holding of the Nanguoli online e-commerce live streaming event also indicates substantial progress in the construction of agricultural informatization in Plain region [6].

3.2 Problems in the Development of Agricultural Informatization in Plain Region

According to the survey data analysis, there are still many problems in agricultural informatization in Plain region, mainly in the following aspects:

3.2.1 Insufficient rural infrastructure construction

25% of the surveyed farmers are dissatisfied with the current village infrastructure, and only 22% are very satisfied (see Figure 8) (see Figure 9); This exposes some problems. Farmers do not have a good infrastructure, which means they do not have a good development foundation. Most farmers still hope to solve the basic conditions of agricultural production, such as agricultural facilities and water conservancy, first.

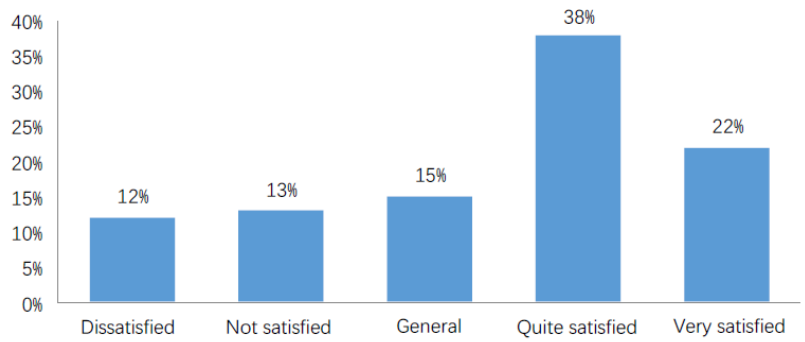


Figure 8. Survey on Farmers' Satisfaction with Current Roads and Irrigation Infrastructure in Farmland

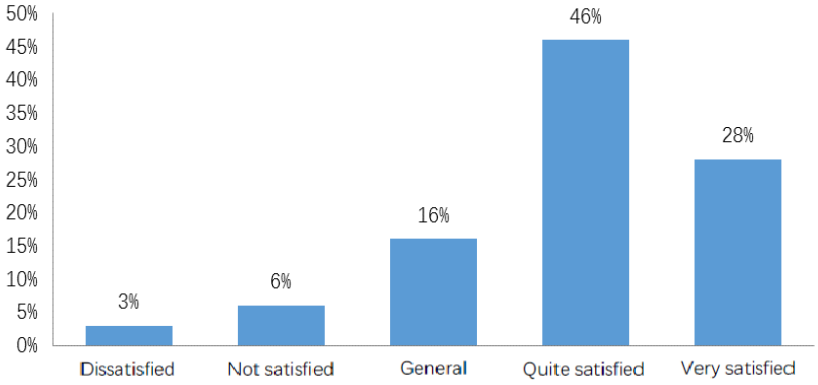


Figure 9. Survey on Farmers' Satisfaction with the Village Living Environment

3.2.2 Weak willingness to demand agricultural information

In the survey, it was also found that farmers are not very interested in information and new technologies during agricultural production, with only one-third believing that e-commerce is helpful for agricultural production (see Figure 10) (see Figure 11). What restricts this phenomenon is that most farmers do not know how to access the internet and do not want to do so.

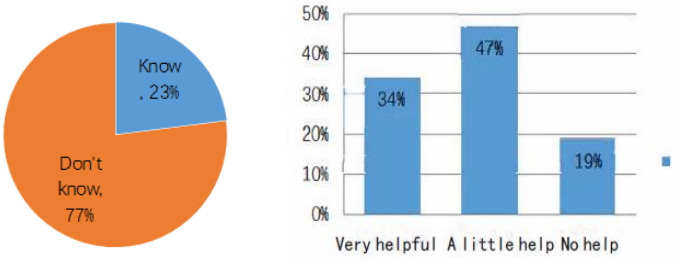


Fig 10. see if farmers know what e - commerce is. Fig 11. a survey of farmers' opinions on the operation of agricultural e-commerce for farmers

The way of acquiring technology is still relatively traditional, with more than half relying on traditional media such as television, and very few farmers learning through the internet (see Figure 12).

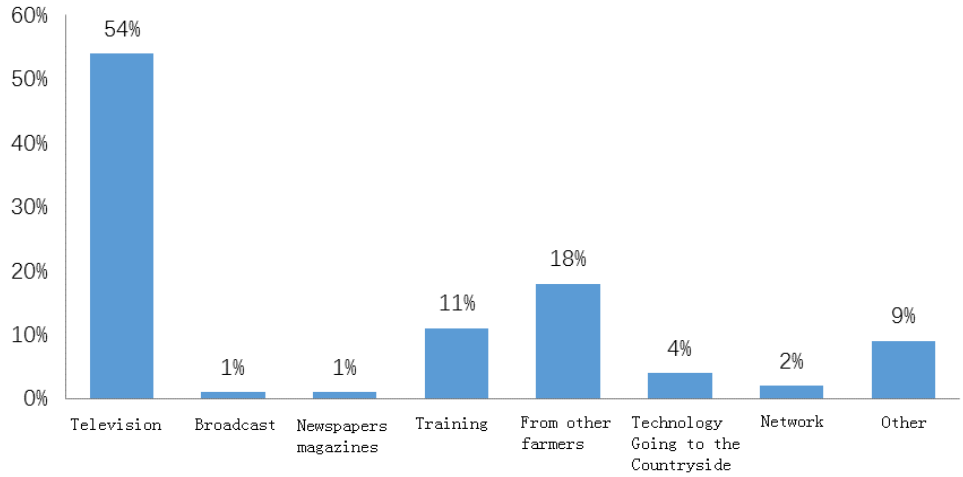
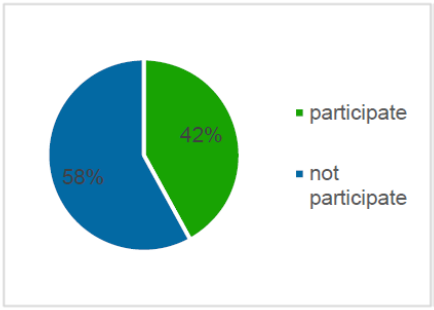


Figure 12. Ways for Farmers to Obtain Information

The training in agricultural technology is not very developed, with more than half of the farmers having not participated in agricultural technology training, and a large number of farmers not using experiential techniques in agricultural production (see Figure 13) (see Figure 14).



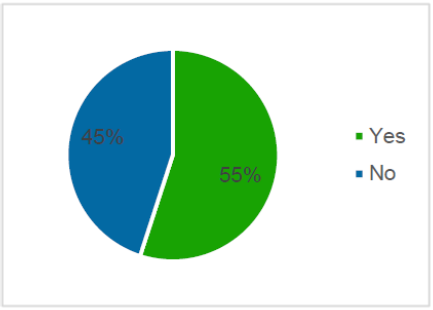
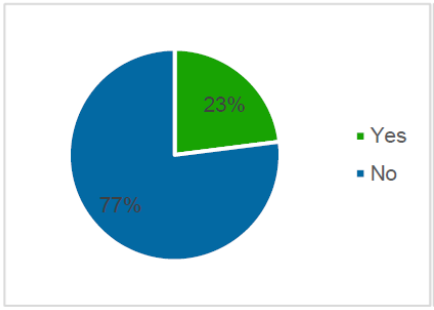


Fig 13.whether to take part in the training of Agricultural Technology Fig14.whether new technical measures are adopted in agricultural production

3.2.3 Poor channels for agricultural information dissemination

Only 23% of surveyed farmers have the habit of surfing the internet on a daily basis, averaging about 2 hours per day. Among them, more than half of the farmers use computers to surf the internet, 20% use mobile devices, and the rest use both, accounting for 26% (see Figures 15 and 16). Farmers mainly browse information online (including agricultural technology, production technology, breeding technology, etc., check market trends, etc.), browse news and web pages, chat with relatives, play games, watch movies, shop.



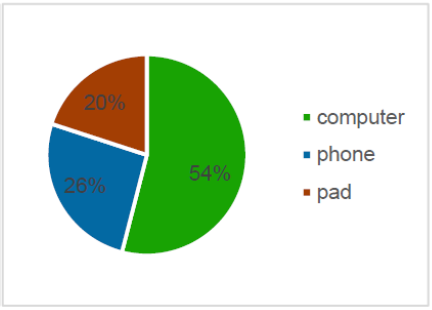


Figure 15. Survey on whether farmers go online Figure 16. Survey on how farmers usually go online

Among the surveyed farmers, the proportion of online farmers is relatively small, which can also be seen from the channels for farmers to obtain information. As shown in Figure 17, television is still the main way for surveyed households to obtain various types of information. In addition, the most common leisure activities of surveyed farmers are watching TV and listening to the radio.

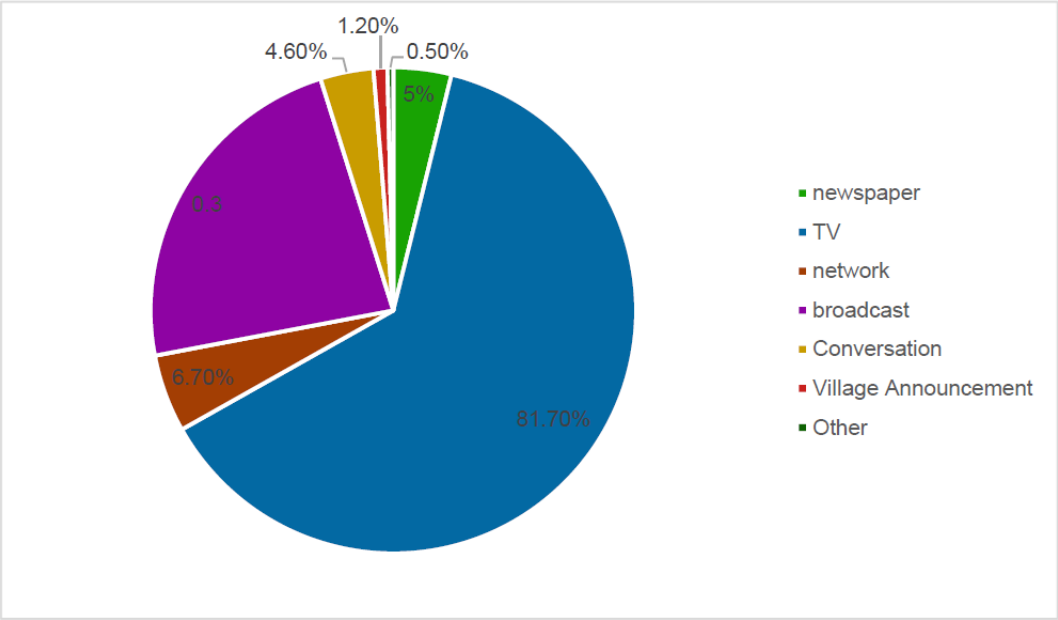


Fig 17. survey farmers' families to obtain the main channels of information

3.2.4 Difficulties and Problems in Farmers' Development

In this WeChat official account survey, the data also intuitively reflect what problems are troubling farmers' development (see Figure 18).

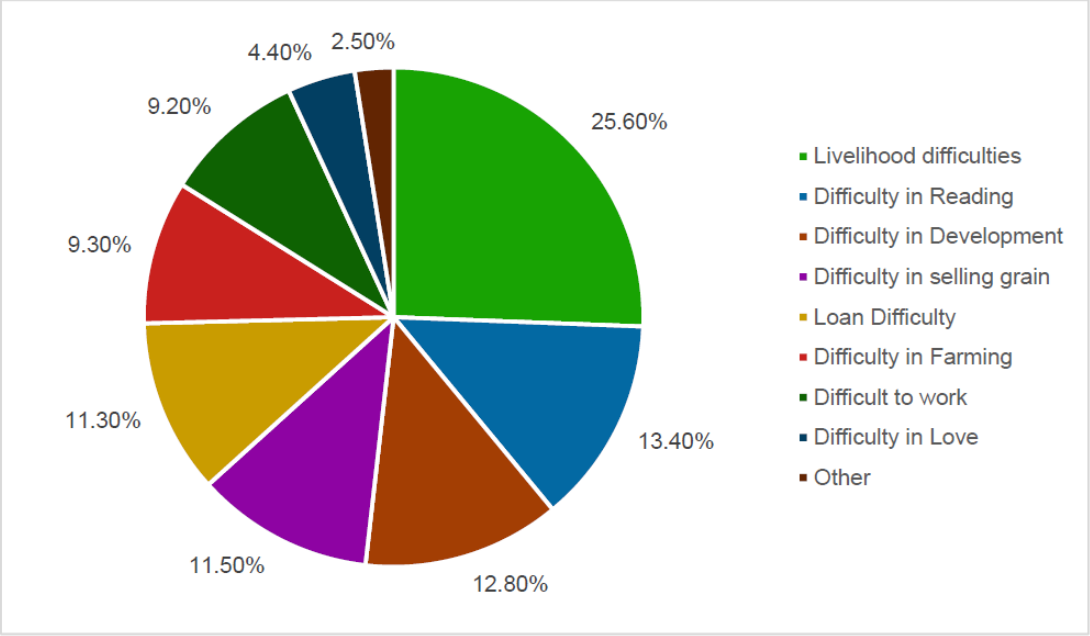


Fig 18. survey farmers' families to obtain the main channels of information

Regarding the difficulty in seeking medical treatment, it mainly reflects the high cost of medical treatment and medication for farmers, and the inability to achieve reimbursement from other places. Some farmers say that they cannot afford to see a doctor without money and hope to achieve a one card system. Some farmers hope to have regular physical examinations like urban workers, so that they can be detected and treated early.

Regarding the difficulty of elderly care, it mainly reflects the increasingly serious aging of rural

areas. Most of the elderly's children go out to work, and those who can take care of them are not around, which makes them unable to cope with many aspects such as medical treatment and farming. Most farmers hope to have a sense of security, care, and a peaceful old age.

Regarding the difficulty in reading, it mainly reflects the high cost of education, expensive school buses, high fees for make-up classes, and a heavy burden on parents.

Regarding the difficulties in development and payment, it mainly reflects that farmers want to develop certain businesses and have difficulties in obtaining payment. Some farmers struggled to develop because of a lack of projects.

The difficulty in selling grain mainly reflects the fact that agricultural products in the hands of farmers cannot be sold, and it is difficult to sell agricultural products online because most people who are truly engaged in agricultural product production are middle-aged and elderly people who do not understand computers very well. We hope that the government will build a practical online sales platform for farmers [7].

4. Analysis of Reasons and Development Strategies for Agricultural Informatization Construction in Plain region

4.1 Analysis of the Causes of Agricultural Informatization Issues in Plain Region

Previous investigations have found that there are still some problems in the process of building agricultural informatization in plain regions. The main reasons for these problems are as follows.

4.1.1 Factors related to information supply

In this questionnaire survey, based on comprehensive statistical data, we can see that there are many problems because users simply have no access to the latest information and there is no channel to access new information. Information is also supplied by an information provider. The current information provision is not perfect and accurate enough to meet the daily needs of farmers. In addition, the government has not managed the information well, resulting in information imbalance, and there are some places that do not disclose or share information, resulting in a serious decline in resource utilization [8].

As disseminators of agricultural information, the quality and level of employees in government departments and agricultural websites vary. At present, most of the personnel engaged in computer network technology research are graduates from colleges and universities and have profound scientific and theoretical knowledge. However, in the agricultural industry, farmers rarely participate in agricultural production or conduct field investigations in rural areas and know little about the difficulties encountered by farmers in production and the information content that farmers need to know urgently. Therefore, when farmers produce and release agricultural network information, they often have a strong sense of subjective judgment, and the information they release is often divorced from the actual needs of production, which is less used by farmers. Although some staff members have more practical experience and understand the needs of farmers, they are unable to provide farmers with truly valuable information because of the lack of strong support from scientific theories and data.

The lack of market information has directly led to the narrowing of the interests of producers and operators, and the narrowing of their living space. It is difficult to achieve low profits and high turnover, and cannot form a win-win situation. Such a vicious circle is that less information flows into the market, which restricts the construction of agricultural informatization from the source.

4.1.2 Factors related to information needs

Currently, most farmers have a weak desire for information, and still rely on the experience of the older generation rather than learning new technologies. The fundamental reason is that it is difficult for small-scale operations to bear the cost of new technologies, insufficient funds prevent farmers from purchasing Internet devices, and even if they receive valid information, they are unable to arrange production due to a lack of funds, resulting in information waste [9]. This seriously hinders the process of agricultural informatization, with reduced demand leading to a reduction in technology investment and slow construction.

4.1.3 Factors influencing information transmission methods

Transmission mode is the most important link for connecting information users and providers. A good transmission mode can make full use of this information. The current survey found that the existing transmission mode is still relatively old and has many problems that can effectively improve the efficiency of agricultural informatization construction, and the experience mode has not been well developed and applied. It is difficult to realize its own value and to solve this problem.

Currently, television is one of the main ways for farmers to receive information. There is much agricultural information and information related to rural development on television channels across the country. The CCTV agricultural channel, which provides information services for farmers, agriculture, and rural development, has also opened. However, 93% of villages receive very weak TV signals, and many users are unwilling or unable to pay a cable fee of 108 yuan per year. Therefore, cable television is basically blank in vast rural areas, so it is difficult for all kinds of information related to agriculture and rural economic development to reach farmers. In recent years, traditional information release channels, such as loudspeaker broadcasts, wall newspapers, newspapers and magazines, conferences, and lectures, have gradually disappeared or lost their role in rural areas. Even though there is still a lack of organic combinations and collocations between some of the remaining traditional information release channels and modern information release channels, such as networks, television, and telephone, there is no interaction, and only one-way information can be transmitted. Only a few regions have begun to use the Internet or combine it with traditional media to spread information [10].

4.2 Development Strategies for Agricultural Informatization in Plain Region

Agricultural informatization is a long-term and sustainable process that cannot be rushed for a while. Problems are normal. Through this survey, some problems in the construction of agricultural informatization in the plain region were also discovered. After careful analysis, the following suggestions were proposed for reference.

4.2.1 Strengthen the role of the government in agricultural informatization construction

At present, the role of the government in agricultural informatization construction is still in an extensive stage and requires further strengthening. The government needs to strengthen macroeconomic regulation and control in the process of agricultural informatization to better play its leading role, coordinating role, organizational management role, and regulatory role, in order to fully exercise its functions of serving agriculture and organizing rural economic construction.

4.2.2 Actively guide non-governmental organizations to intervene in agricultural informatization

While advocating that the government should play a leading role, we should also actively call for more civil society organizations to join. Their organizations are flexible and diverse and can better adapt to the social environment of the public. The diversity of agricultural information needs provides a huge development space for different market players to participate in the construction of agricultural information and information services. Practice has proven that the intervention of non-governmental organizations to further improve the socialization and marketization of agricultural information services can effectively compensate for the insufficient investment of the state in the construction and development of agricultural informatization, further optimize the information supply and demand structure in agricultural information services, and meet the information needs of usability [11]. Therefore, adhering to the guidance of the government and the involvement of social forces is the inevitable choice to widely solve the "last mile" problem of agricultural informatization.

4.2.3 Improve the quality of practitioners and stimulate the demand for informatization

The construction of agricultural informatization is restricted by the low cultural literacy of employees and low utilization rate of information technology. It is necessary to strengthen the efforts of science and technology in the countryside, cultivate informatization talents, improve farmers' technical level and Internet plus awareness, promote technology popularization, achieve sustainable development, teach people to fish, and mobilize farmers' enthusiasm [12].

4.2.4 Accelerate the construction progress of agricultural informatization projects

Continuous improvement of hotline service, optimize the construction of Plain website and database, increase hardware investment, coordinate government efforts to promote network construction, and explore the integration of "Agriculture Project" and "three electricity integration"; Follow the trend of mobile Internet, strengthen the development of agricultural APP, introduce paid expert services and evaluation mechanisms, and attract more experts to the platform.

4.2.5 Promote the comprehensive development of agricultural informatization

There are three typical modes of agricultural informatization: point mode efficiently utilizes information, with low investment and significant results; online mode emphasizes direct connection between information supply and demand, making it more proactive; and building an information network with wide coverage through the face mode, enabling more farmers to receive guidance.

5. Summary and Prospect

5.1 Summary

This paper focuses on the current situation and demand for agricultural information infrastructure construction in plain areas; construction and effectiveness of agricultural information service systems; the application and effect of agricultural information technology in various links of agricultural production; the differences and reasons for regional development of agricultural informatization in plain areas; and reference and comparison of agricultural informatization development experience at home and abroad.

This survey report focuses on the construction of agricultural informatization in the plain region to provide a detailed basis for modern agricultural development. With increasing government investment, rural infrastructure has significantly improved, and information technology construction has accelerated, attracting more forces to participate. However, compared to developed countries, the overall level still needs to be improved, and regional development is uneven. In the future, we need to grasp the characteristics of each stage, with the goal of building a new countryside, adhering to the principle of government leadership and benefiting farmers, building a modern agricultural information system with information services and system applications as the core and transmission networks as the carrier, encouraging social resource investment, innovating mechanisms, helping farmers lift themselves out of poverty and become prosperous, and promoting the balanced development of agricultural informatization.

5.2 Outlook

In the era when the tide of science and technology surges, agriculture, as the foundation of the country, is undergoing unprecedented changes. The Plain area, with its unique geographical conditions and long agricultural traditions, has always been an important position for agricultural development. Looking forward to the future, with the continuous integration and innovation of cutting-edge technologies such as the mobile Internet of things, big data, cloud computing, and artificial intelligence, plain agriculture will realize the leap forward development from traditional agriculture to intelligent agriculture. Precision agriculture will enable every inch of land and crop to receive the most appropriate care, and both yield and quality will be improved. The quality and safety traceability system will ensure the "safety on the tip of the tongue" of consumers and enhance the market competitiveness of agricultural products, and the emergency command system can respond quickly and accurately in the face of emergencies such as natural disasters, pests, and diseases to minimize losses. It can be predicted that plain agriculture will take a new look at intelligence, precision, efficiency, and greening in the future. Farmers are liberated from heavy physical labor and can easily control the entire process of agricultural production through mobile phones, computers, and other terminal equipment. Agricultural products will be seamlessly connected from the field to the consumers' table, expand sales channels, and increase farmers' income. The agricultural ecological environment will also be better protected and improved to achieve sustainable development.

The plains’ agricultural informatization will be usher in the third evolution. With the mobile Internet of Things as the core, it will build a "Internet plus+modern agriculture" service system, covering precision agriculture, quality and safety traceability, and emergency commands [13]. We

need to accelerate the integration of existing information, avoid resource waste, promote IoT applications, such as smart greenhouses, strengthen agricultural database development, and reduce disaster losses. In the era of the mobile Internet, agricultural informatization is unstoppable. We need to actively embrace new technologies, simplify the construction process, allow farmers to share the achievements of informatization, and realize a better life as soon as possible.

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Conflicts of Interest

The authors confirm that there are no conflicts of interest.

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