DESIGN OF SYSTEM SCHEME AND OPERATION MECHANISM ON AGRICULTURAL SCIENCE & TECHNOLOGY INFORMATION SERVICE SYSTEM '110'

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Abstract: Abstract: Agricultural science & technology information service system '110' (ASTISS-110), connected through unitary telephone hotline as well as multipurpose service of the network, television and video etc, is one of the most characteristic content of the Chinese rural informatization. ASTISS-110 is a low cost and high efficiency way to make the agricultural science & technology achievements extension and achieve the combination of science & technology with farmers in the rural area. This paper would primary focus on the ASTISS-110 foundation and system principle. On basis of its main functions and system objectives, we put forward the combination of the 'Sky-Land-People' technical solution, and analyze the management operation mechanism from commonweal service, enterprise management and commercialization operation.

Keywords: ASTISS-110, system, technical scheme, operation mechanism

1. INTRODUCTION

During the transformation period from the conventional agricultural world to an industry and informatization society in China, issues concerning Agriculture, Countryside and Farmers are the biggest challenge (Mei Fangquan, 1997; Xue Liang, 1999,). Nowadays technology extension has made great achievement, but main extension modes in most of regions still concentrate on on-site instruction and training by technician at countryside (Shen Guiyin et al., 2003). However, the communication limited by the factors involving time, location and people etc. has caused the extension method unitary. The original agricultural extension system is difficult to meet with epoch requirements on account of the fund shortage, job hopping and vulnerable for expanding the use of agricultural technology. The only way to achieve the agricultural modernization and informatization and make the rural economy flourish is to spread and exploit the information technology which makes farmers fast master the science & technology and information resources in time, convenient(Jia Shangang,2000; Bai shuo,2003;Chen liangyu,2005).

The farmers' demand for science & technology information is limited by the space-time and economy. China has already established the agricultural information service network coverage at provincial, city and county level. However, when the information spreads to the countryside, village and rural household, the price of the computer is almost half of the farmers' annual revenue. Inconvenient transportation, poor education condition, traditional production mode and limited ability to get information resources seriously effect the construction of the agricultural information service system. 'Last one-mile' and 'Digital Gap' have become the most popular issues in the construction of the agricultural information service system. Spot check results indicate that about 0.5% of online users are usual farmers and about 1.3% of the farmers have experience to harvest the science & technology and information online(Hu Zhiquan et al.,2005).

Considering the situation of the rural area in our country, farmers can fast, conveniently and accurately get help by choosing the cheapest telephone to communicate with the science & technology extension people, agricultural experts or technical support and information service, computer system and networks. The number of the telephones has exceeded 640 million, customers of fixed telephone and mobile phone separately amount to 310 million and 330 million. The rural fixed telephone customers have reached 102 million accounting for 32.5% of the total (Wu Yongchang, 2006). Since the concept of agricultural science & technology service system '110'(* Note: '110' is an emergency call number in China，it was referred to quick response in the Agricultural science and technology Information service system.)(ASTISS-110) has emerged by Quzhou City, Zhejiang province,

ASTISS-110 has made speedy development in this period. Farmers could get the technological advice and information service by mean of receiving signal by terminal modes of remote satellite, internet, video and telephone etc. that forms some new thought and mechanism. In relative to traditional rural agricultural science & technology transmission modes, ASTISS-110 mode has overcome the influences by space-time limitation and weak interactivity, and has satisfied farmers' growing needs on agricultural science & technology service. It provides a fast channel to make agricultural and rural science & technology information spread in fast, practical, effective and real-time way so that could demonstrate the rich connotation and tremendous vitality (Wu Yongchang,2007).

2.   SYSTEM PRINCIPLE OF ASTISS-110

Agricultural science and technology service system '110'(abbreviation ASTISS-110) takes uniform service hotline as the ligament, telecommunication and broadcast network as the foundation, as well as information resources database as the core. By means of connecting with the internet, using the comm. & networking and digital technology, adopting the multiple teminals, perfecting the rural information network and integrating the rural service power, farmers can get the information cheaper, faster and more effective. Information has functions for farmers in making rich in a rapid reaction and zero distance service.

2.1   System structure of ASTISS-110

ASTISS-110 is composed of three networks involving three sub-systems of the sky, the land and the people. The system structure can be seen in details from Fig 1.

The 'sky' network composed of internet network at state, region and county levels is used for information integration and resources optimization. Nowadays 100% of provinces, cities and municipality, 80% of prefecture cities and about 50% counties are equipped the information network facilities. The 'land' network comprises with receiving terminals and call centers hotline network distributed in various cities. Hotline number 12396 funded by Chinese National Spark Program （CNSP）of the Ministry of Science and Technology (MOST) has already put into operation, 20 provinces or cities have constructed 188 ASTISS-110 service sub-centers which are the combining cites of network resources and telecommunications service. It fulfills the information resources distributing to grassroots level and feedback function. The 'people' network made up of grassroots level

service organizations and messengers spread all over the country including experts, special correspondents, schools, leaders, leading enterprises, transformation centers, intermediaries, 7000 agricultural materials companies. 110 thousand agricultural information messengers from the farmer broker, cropping and poultry managers, farmers' specialized cooperative economic organization and intermediate agencies people are the key to convert information resources to real productive power and implement zero-distance information service.
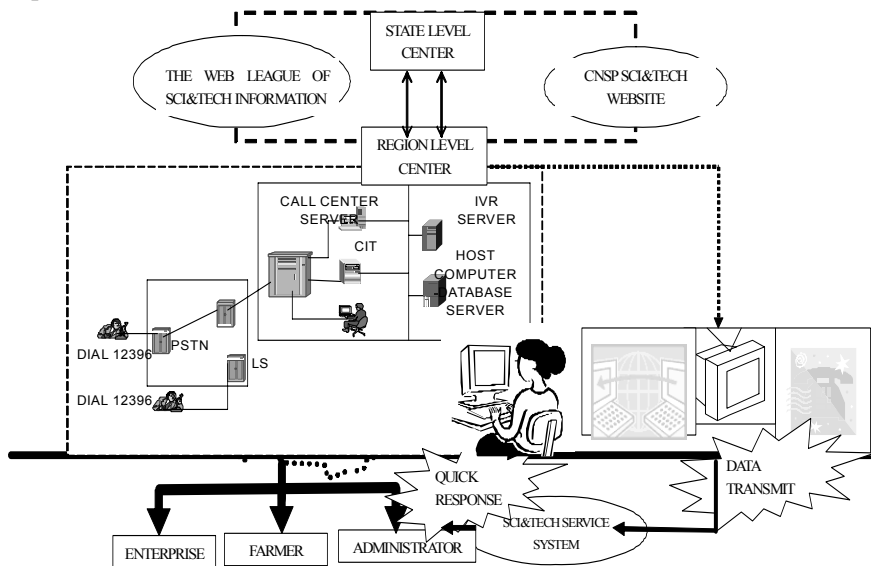

Figure 1: Diagram of 'Sky-Land-People' network structure

2.2 System functions of ASTISS-110

ASTISS-110 system functions consist of information resources integration, sharing, service and feedback.

Integrating and sharing. To gathering, arrange and process the dispersed scientific and technological outputs from different departments, internal departments, districts, fields and enterprises. Through the 'Sky' and 'Land' network, it can form the uniform incessant database which can be queried and searched by the information resources providers and users.

Serving and feeding-back. ASTISS-110 institution, the information and control center, could organize the rural science & technology service staff and capital goods dispatching enterprise to put the science & technology and capital goods to rural labors. It could accelerate the outputs transformed and applied by means of the 'Land' and 'People' network.

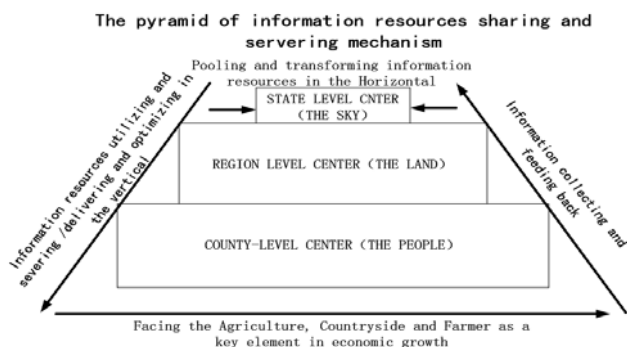## 2.3   Information sharing system and service mechanism

Figure 2: Diagram of information resources sharing and service mechanism

According to the ASTISS-110 operating principle shown in Fig 2, ASTISS-110 has formed sharing mechanism of pyramidal data, service and technology. It is relationship of resources distribution and services from the top to low levels that transfers gradually from outputs information-intensive to scientific and technological service-intensive. It is an information feedback system which forms a smooth information upload channel from low level to the top. The 'Sky' network is based on the principle of resource integration, the 'Land' network mainly is based on network resources and telecommunications service and the 'People' network focus on service gathering and rapid reaction. According to the characteristics of different districts, it uses the uniform hotline 12396 to put forward the demand, adopts various of service modes of the internet, telephone or mobile-phone, television, satellite, broadcast to get the information resources. The core is to combine the technology with agro-material supply and information service in operation.

3.   ASTISS-110 TECHNOLOGICAL SCHEME

According to the scheme, the main body of ASTISS-110 is composed of database, network, call center, internet service websites and users' receiving system.

3.1   Database system

Under the uniform classification and standard, database as the resources foundation of the whole platform, at least include two types of supply and need , 9 databases including agricultural science & technology production

database, agricultural organization database, agricultural experts database , agricultural policy and rule database, market information database, agricultural training courseware and teaching material database, directory database, demand information database and information feedback database, has the function on inquiry, search, update and maintenance.

3.2   Scientific information sharing and service network system

The Web Services platform, which relies on the website of Spark Program of China, is the important carrier and channels of the whole platform, with which function as rural science & technology outputs exhibition, transaction of the rural science & technology outputs and information, science & technology decision supporting, rural science & technology training. It provides the channel of users' information demand and feedback, and it also has the ability of network platform system management.

3.3   Call center service system

Call Center system, which relies on local junction center, is the hinge in the whole platform with the function of information consultant, information service, information gathering, arrange and feedback, help information automatic classification system, Major Animal Epidemics, plague emergency and disaster emergency report to the leaders. It provides functions on the service mode of automatic alternate voice, manual work, messages, science & technology outputs Information customization and transaction etc.

3.4   ASTISS-110 service websites

ASTISS-110 service websites are the basic service units in the whole platform which provide the direct and fast service for issues concerning Agriculture, Countryside and Farmer. By means of constructing front-line science & technology service platform with multiple technical services that include department of agriculture, forestry, aquatic products, livestock, water resources, weather and science & technology extension units resources which involve colleges, science &technology special correspondent, schools. There are still including social intermediary agent, agricultural technological entrepreneurship, guilds, rural organizations for economic cooperation etc.

3.5 Users receiving system

Users' receiving platform is multiple terminals platform that is the target group of agricultural science & technology and diversifying receive mode. The receptive system could be information receiving terminal such as telephone, cell-phone, television, wire broadcasting or wireless broadcasting, internet, satellite, publication, blackboard newspaper etc.

4. OPERATION AND MANAGEMENT MECHANISM

4.1 Scheme I: Commonweal service

ASTISS-110 is a commonweal in a long run except multi-channel financing. Supporting and training the disadvantage group farmers are all base on the principle of government and public supporting around the world. We suggest that Ministry of Science and Technology (MOST), All China Women's Federation (ACWF), Central Committee of Communist Young League, Ministry of Information Industry, Ministry of Agriculture, Ministry of Education work together to set up non-profit organization Chinese ASTISS-110 Information Service Fund which could accept donation by the caste, enterprise, individuals and government branch.

This scheme has strong advantage in building up the ASTISS-110's framework at the beginning, but lack of flexible and long-term inefficiency operation and management mechanism could be the government burden and adverse to sustainable development for ASTISS-110.

4.2 Scheme II: Enterprise management

Enterprise invest in ASTISS-110 with comprehensive enterprise management that could develop enormous commercial opportunity, Guangdong province has already tried to adopt the operation mechanism. The advantage of this scheme is so flexible that beneficial to develop ASTISS-110 and its convenient operation and less burden for the government. However, it is difficult to form the service network at the beginning. When conflict of interests between the enterprise and farmers has emerged, farmers always were at a disadvantage for enterprise pursuing the maximal profit.

4.3   Scheme III: Commercialization Operation

The implement of ASTISS-110 is tight combined with the extension mode of agricultural science & technology expert yard and special correspondent. It can achieve the goal of government administration; enterprises dominant, farmers benefiting to make the government guidance combined with market-oriented, non-profits service combined with productive service.

It should depend on the local government to construct the ASTISS-110 service platform and with the given necessary polices and financial support to make full play to serve issue concerning Agriculture, Countryside and Farmers. The departments of science & technology, agriculture, forestry, telecommunications should work together to organize the colleges, scientific research institutes, corporate champion and various service organization to carry out technical training, develop expert database and service standards and also supervise and check the process to promote the healthy development.

To enable ASTISS-110 sustainable development, the ideas of market, corporation management and capital efficiency play a key role in pushing such mentioned organizations to undertake the ASTISS-110's construction and management to form a famous brand of public interest social system. By means of the ASTISS-110's service, the profits could be brought out from market service to choose quality agricultural products, virtue seed and non-gratuitous technical guidance and service from the agricultural experts and special correspondents.

5.   CONCLUSIONS

To construct the rural information service network ASTISS-110. On the one hand, it could meet the farmers' growing demand for agricultural science & technology informatization, and it is an effective path in resolving the problem 'last one-mile' in rural informatization. On the other hand, it could integrate the technology, talents and outputs resources from colleges, universities, and institutes and accelerate the commercialization of research finding and technology extension. It is not only propitious farmers to shake off poverty and set out on a road to prosperity, but also play an important role in constructing the new socialist countryside and helping farmers, agriculture and countryside to achieve leaps in economic development.

ACKNOWLEDGEMENTS

REFERENCES

Bai Shuo. Analyzing Agricultural Informatization and Stimulating Farmers' Income. Rural Economy 2003, 6, 57-59(in Chinese)

Chen Liangyu, Chen Ai Feng. Present situations and development orientations of China's Rural Inform ation Development. Review of China Agricultural Science and Technology, 2005, 7, 2 ,67-70(in Chinese)

Fu Hongxun. Chinese Agricultural Informatization Development. Problem of Agricultural Economy. 2002, 11,44-47(in Chinese)

Hu Zhiquan, Wu Yongchang, Cheng Guangyan. Informatization and issues concerning Agriculture, Countryside and Farmers. cChina Information Times, 2005, 16,16-18 (in Chinese)

Jia Shangang. Golden Agricultural Project and Agricultural Informatization. Agricultural Information Study. .2000, 1, 5-10(in Chinese)

Lu Xiaoyan. Agricultural Modernization and informatization. Chinese Agricultural Science & Technology Press. 2002, Beijing (in Chinese)

Mei Fangquan. Prospects of China Informatization Construction. Computer and Agriculture. 1997, 3, 1-3(in Chinese)

Mei Fangquan. Strategy Analysis of Agricultural Informatization for Agricultural Modernization. Chinese Rural Economy, 2001, 12 (in Chinese)

Shen Guiying, Gu Huang Zhang. Trends of Agricultural Informatization Development in Foreign Countries. World Agriculture, 2003, 8, 4-6(in Chinese)

Wu Yongchang. ASTISS-110's current situation and system assumption. Proceedings of ASTISS-110 high level forum. Hainan, 2007 (in Chinese)

Wu Yongchang. Chinese Spark ASTISS-110 system principle and design scheme. Proceedings of 20th annual Spark program high level forum Hainan , 2006(in Chinese)

Xue Liang, Fang Yu. Agriculture Informatization. Jinghua Press, 1999, Beijing. (in Chinese)

Zhao Ping. Theory of Information Resources Development in 21th Century Agricultural Informatization. Economy Science Press. 2000, Beijing(in Chinese)