

Association for Information Systems AIS Electronic Library (AISeL)

PACIS 2008 Proceedings

Pacific Asia Conference on Information Systems
(PACIS)

July 2008

THE SERVICE MODELS AND TECHNICAL MODELS OF AGRICULTURAL INFORMATIONIZATION

Guangqian Peng

Business Administration Department, Wageningen University, guang-qian.peng@wur.nl

Wensheng Wang

Agricultural Information Institute, CAAS, Wangwsh@caas.net.cn

Follow this and additional works at: <http://aisel.aisnet.org/pacis2008>

Recommended Citation

Peng, Guangqian and Wang, Wensheng, "THE SERVICE MODELS AND TECHNICAL MODELS OF AGRICULTURAL INFORMATIONIZATION" (2008). *PACIS 2008 Proceedings*. 36.

<http://aisel.aisnet.org/pacis2008/36>

This material is brought to you by the Pacific Asia Conference on Information Systems (PACIS) at AIS Electronic Library (AISeL). It has been accepted for inclusion in PACIS 2008 Proceedings by an authorized administrator of AIS Electronic Library (AISeL). For more information, please contact elibrary@aisnet.org.

THE SERVICE MODELS AND TECHNICAL MODELS OF AGRICULTURAL INFORMATIONIZATION IN CHINA

Wang, Wensheng, Agricultural Information Institute, CAAS, Zhongguancun South Street 12#, Haidian district, Beijing 100081, CN, Wangwsh@caas.net.cn.

Peng, Guangqian, Wageningen University and Research Center, Hollandseweg 1 (Building 201), 6706 KN, Wageningen, NL, Guang-qian.Peng@wur.nl.

Abstract

Types of rural-urban gaps exist and seem expand in China, although agriculture and rural lives have obtained significant enhancement since the “opening and reforming” policy started in 1980. Amongst these gaps, digital gap is critical itself, and may widen other gaps. How to promote agricultural informationization (agri-informationization) effectively and efficiently is a great challenge to Chinese government and Chinese people nowadays. Meanwhile, the agri-informationization also brings opportunities with new markets, new technology and new rural culture, etc.

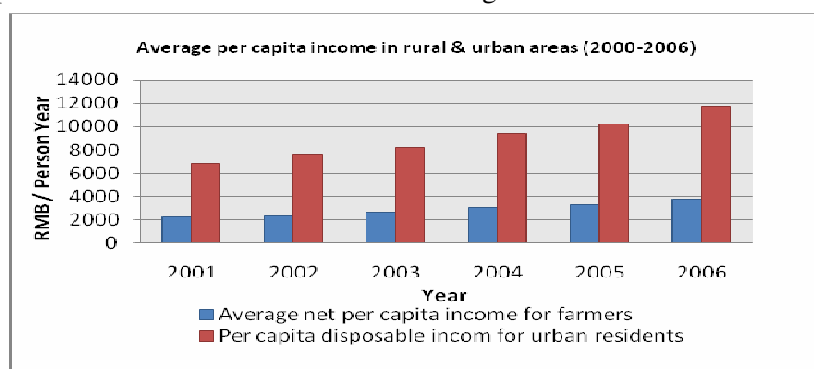
Firstly, this article introduces the background about Chinese rural areas and rural economy in brief. Secondly, it gives focus on typical types of information service models and information technical models which appearing in the process of agri-informationization. Thirdly, the problems and challenges are analyzed. Finally, the article ends up with a conclusion section. We wish the information service models and technical models introduced here be meaningful references for multiple stakeholders, such as police-makers, basic-level officers, farmers, and information companies, in China and in other developing countries.

Keywords: Agricultural informationization (agri-informationization), service model, technical model, China.

1 BRIEF BACKGROUND ABOUT RURAL CHINA

China is a big agricultural country with large number of rural population and broad rural areas. On one hand, 737 million people, namely, 56% of the total population, live in rural areas. On the other hand, the agricultural output value accounts for 15% of the total GDP, which means agricultural production still takes an important position for the national economy. In 2005, the output value of township enterprises accounts for 27.9% of the National GDP, 46.3% of the national industry value added, 27% of the financial income, and 40% of the foreign exchange earned through exports. The total output value from agriculture production and township enterprise, accounting for 43% of the national GDP, is an important factor to promote the economic and social development in China. (China Statistics Yearbook 2005)

Although the rural economy has obtained quick development since the “opening and reforming” policy started in 1980, its growth rate still heavily lagged behind the growth rate of urban economy, and the rural-urban gap is getting larger. Currently, 21.48 million rural poor people still face the problem of food and clothing and 35.5 million are with low-income in China. In 2006, the average net per capita income for farmers is just 3587 *Yuan* (Fig. 1), while the per capita disposable income for urban residents is 11759 *Yuan*. The urban-rural income ratio is 3.28:1 (Sina news report). The following figure shows the per capita income gap between rural and urban residents during 2000-2006.



(Source: China State Council Leading Group Office of Poverty, 2007)

Figure 1 Average per capita income in the urban & rural area (2000-2006).

Except per capita income gap, other types of rural-urban gaps exist broadly, including infrastructure gap, education gap, medicine and health gap, social security gap, and digital divide, etc. Amongst these gaps, digital gap is critical by itself, and may widen other gaps in an information age. How to promote agricultural informationization (agri-informationization) construction effectively and efficiently is a critical challenge to Chinese government and Chinese people nowadays. Meanwhile, the process of agri-informationization also brings opportunities with new markets, new technology and new rural culture, etc.

In this article, by agri-informationization, we means the historic process and practical act that taking the usage of modern information technology and information systems to provide strong information supports for the productions, delivery, marketing, administration and services in agriculture sector, and at the end, to enhance the comprehensive productivity and management efficiency of agriculture sector. Agri-informationization contains various aspects including: the informationization of rural society life; the informationization of agricultural production and management; the informationization of agricultural science and technology; the informationization of agri-product markets; and the informationization of decision-making

of agriculture management, and so on. The essential objective of agri-informationization is to fasten the development of agriculture and to enhance farmers' economic and cultural life levels.

To construct agri-informationization effectively and efficiently, it is important to select the right information service models and information technical models which are farmer-oriented and suitable to the local economic and social conditions. The following parts generalize several typical service models and technical models which are used in the processes of agri-informationization in China. Then, we analyzed the problem and challenges of Chinese agri-informationization and end the article with a synthesis.

2 THE SERVICE MODELS AND TECHNICAL MODELS OF AGRICULTURE INFORMATIONIZATION IN CHINA

2.1 Typical service models of agri-informationization

Since entering the new century, some successful service models of agri-informationization have been used to disseminate technology and market information and to service rural development. They are classified below for feature analysis.

First, the service models of agri-informationization can be sorted into three types according to the transmission physical vectors, including: the traditional service model, the Internet service model and the mixed service model (Zhong 2004; Huang 2006; Wang et al. 2006; Wang 2007).

(1) The traditional service model

With the traditional service model (figure 2), types of information about agricultural resources, practical technologies, agricultural markets, and policy and regulations are transmitted to farmers. Such information help to guide the production and sales of agricultural products through traditional media such as radio, television, telephone, and newspapers and journals. The traditional model has the features such as: being easy to get started, wide dissemination and low cost; but is with the shortages such as: single direction of information dissemination and receiving information passively by users.

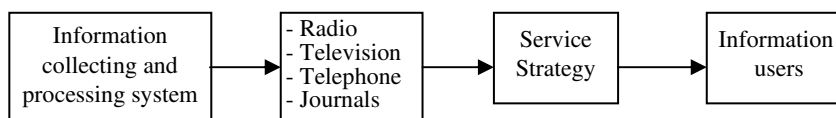


Figure 2 The process of the traditional information service model.

(2) The Internet service model

With the Internet service model (figure 3), information resources are transmitted through Internet to rural users to guide and organize the production and sales of agricultural products. Different from the traditional service model, Internet service model has advantages such as diversified service providers, various information users, rich information and timeliness, etc. Meanwhile, it is with disadvantages such as: high service cost and repeated construction of information resources, etc.

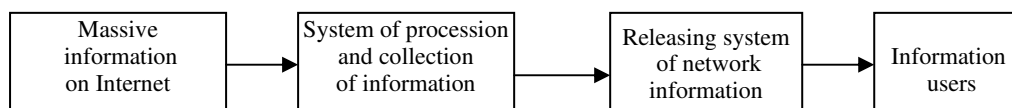


Figure 3 The process of Internet information service model.

(3) Mixed information service model

Mixed information service model (figure 4) is an innovated model which integrates various agricultural information resources and combines traditional and modern media to transmit information by appropriate manners according to local conditions. It integrates traditional service model with the Internet service model, makes full use of the advantages of diversified media. This model can service variety of demands from different information users in different industry and in different areas.

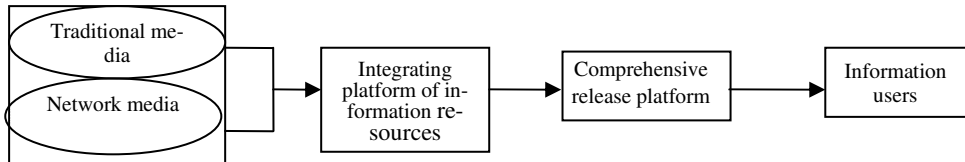


Figure 4 The process of the mixed information service model

Second, the service models of agri-informationization can be also sorted into seven types according to information service providers, including: the government-led promotion model, the trade associations model or self-service model of cooperative economic organizations, the wholesale markets radiation and diffusion model, the leading enterprises integration model, the professional information companies or website market operation model, the leading households and brokers demonstration model, and the international cooperation anti-poverty model. These seven models are introduced below and are called collectively as the management and organization service model of agri-information. (Zhong 2004; Wang 2007)

(1) The government-led promotion model

In this model, the leading role is played by the government. The agri-informationization is promoted by governments at village, township or county levels through constructing various public information service platforms such as information centres and information stations, etc..

● **Service station**

With service station (figure 5), county information service centres are established relying on science and technology offices at county level, and extended downward to build township information service stations. In some villages with high demands for information, village information points are set up relying on village committee and leading households of cultivation, feeding or sales. By this way, a comprehensive information organization with three levels (namely, county level, township level and village level) is established.

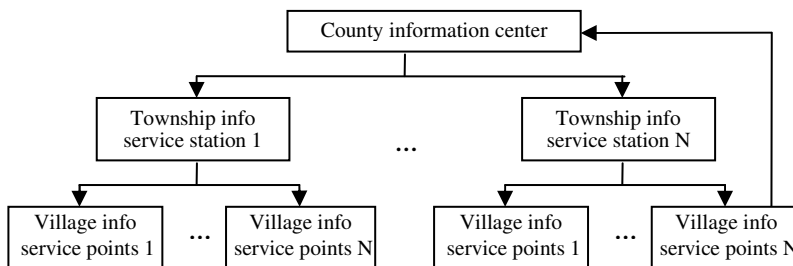


Figure 5 The process of service station model.

● **Agricultural service hall**

An agricultural service hall (figure 6) integrates multifunctional information services and provides one-stop service to farmers. A typical such service hall is the one located in Gaocheng downtown. It was invested and built by the agricultural bureau of Gaocheng city of Hebei province. This “hall” has seven service areas in the 108 square meters including: the agricultural expert advice area, the agricultural query area with touching screens, the agri-products demonstration area, the real-time information release area, the screen area of agri-science films, the reading area of agri-technology books, and Internet query and release area of agri-information.

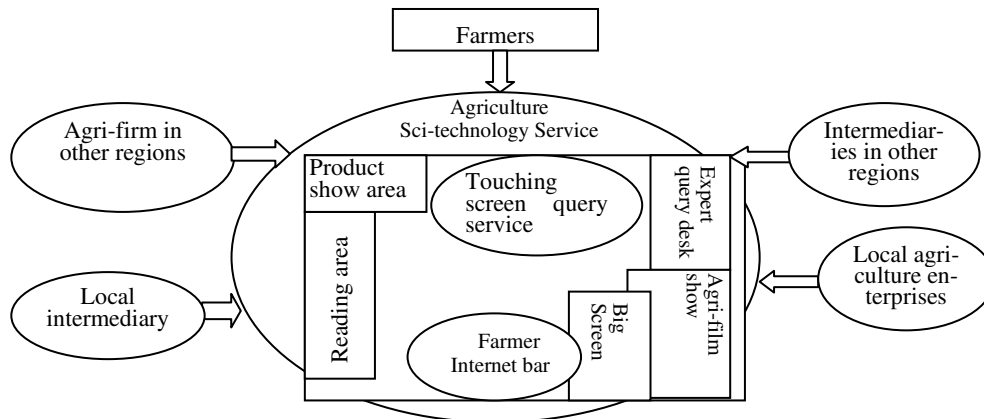


Figure 6 The structure of agricultural service hall.

● **Expert courtyards**

Expert courtyard (figure 7) is a service model combining multi-disseminators of information. With expert courtyards, the daily works are managed by enterprises or trade association, while the government information service offices cooperate to provide full service, to formulate development plan, to design management manners of experts and expert courtyards, etc. The expert employees are responsible for researching, exploring and promoting new and high technology, and providing technology training to farmers. Meanwhile, farmers are both disseminators and users of information. On one hand, they produce agri-products in scientific and standard ways according to technical guidance from experts and according to market information from enterprises. On the other hand, they disseminate information to each other and feedback information to expert courtyards.

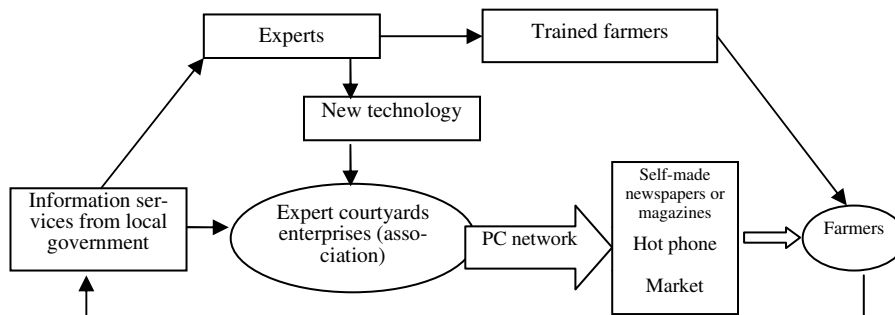


Figure 7 The structure of expert courtyard.

● **Science and technology 110**

Currently 188 110-service centres have been established in 20 provinces or municipalities. The service forms include telephone counselling, remote satellite receiver, television, and video, etc. Through calling “science and technology 110”, farmers can obtain voice advice about cultivation, breeding and feeding, markets and resources.

- **Three electronic tools in one**

“Three electronic tools in one” is an information service model promoted by Ministry of Agriculture in rural China. The three electronic tools are telephone, television and computer. Six cities and fifty counties with certain foundations were selected for the pilot projects of “three electronic tools in one” in 2005. This service model is expected to bring timely agri-information to all farmers who own telephone, television or computer and, in this way, to solve “the final one kilometre” information problem.

(2) The trade associations model or self-service model of cooperative economic organizations

With the trade association model (figure 8), farmers who producing same or similar products are organized by leading farmers in a volunteering way in counties, townships or villages, where large amount of specific agri-products are produced and specific information is demanded eagerly. Trade associations are self-managed and self-served by farmers. They provide information about techniques, markets or policy. Some of them also help purchase unite production materials or sale products for farmers. Regional cooperative economic organizations are established to provide self-service in a volunteering way with a village or a village farmer group as a unit. This service model is similar to trade association model in the form and mechanism of production information service, but its service contents are not limited to certain agri-products or certain specific fields.

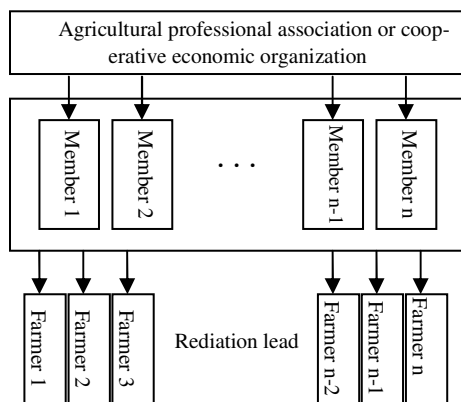


Figure 8 The structure of the trade association model or self-service model of cooperative economic organization.

(3) The wholesale market radiation and diffusion model

With this service model (figure 9), information is provided relying on multi-functions of wholesale markets such as commodity distribution, pricing, information collection and releasing functions. Types of information about price, supply and demand in the wholesale market are distributed to neighbouring regions, to the whole province or to the whole country through the collecting and releasing information systems such as market information centres or market information websites. Meanwhile, market management levels and trade efficiencies are improved through electronic clearing system.

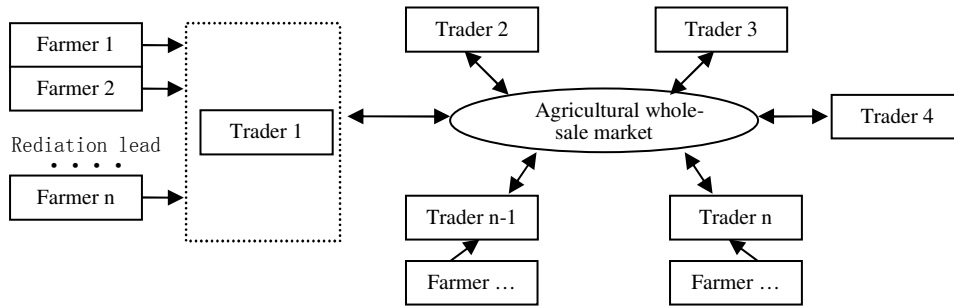


Figure 9 The structure of the wholesale market radiation and diffusion model.

(4) The leading enterprises integration model

With this model (figure 10), leading agricultural-related enterprises, namely, dragon-head enterprises, establish enterprise websites, collect relative information online, release purchasing and selling information, guide farmers' production, purchase their products, and provide full services from production, supply to sale phase for farmers. With this model, leading enterprises obtain profits while farmers obtain increased income and the solutions for the problems of "without both technology for producing and markets for selling".

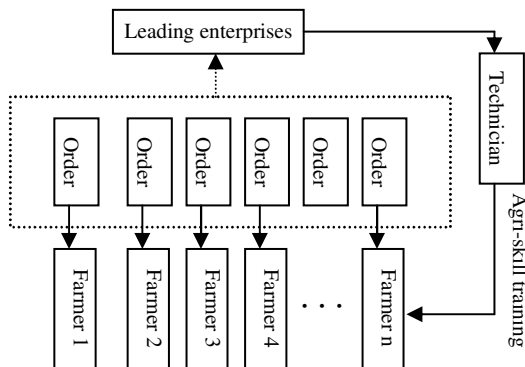


Figure 10 The structure of leading enterprises integration model.

(5) The professional information company or website market operation model

Since 1990s, many information enterprises or commercial websites started to provide information services for farmers or for rural small- and middle-sized enterprises in order to obtain wider profit margin and to expand business areas. The examples include Beijing Agricultural Information Communication Co. Ltd., Agricultural Doctor Web and Billion Farmer Web. Figure 11 shows the structure of the professional information company or website market operation model.

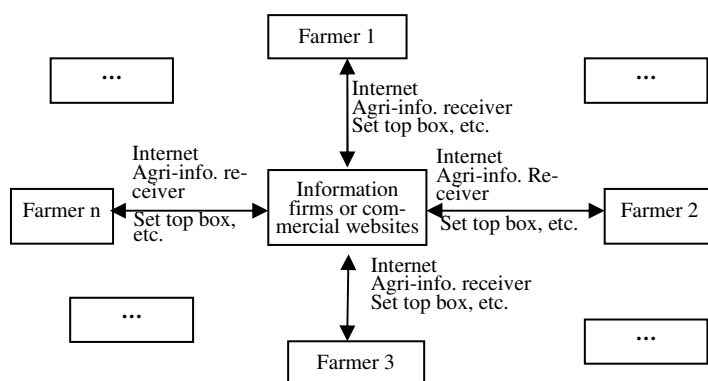


Figure 11 The structure of the professional information company or website market operation model.

(6) The leading household and broker demonstration model

With model (figure 12), brokers and leading rural technology households, including those specialized in cultivation, feeding, transporting or information service, collect broad information about technology, economy or markets through phone, television or Internet. They promote their neighbouring farmers to product, process or sale certain types of agri-products by face-to-face communication or by words and deeds, and realize specified and scaled production.

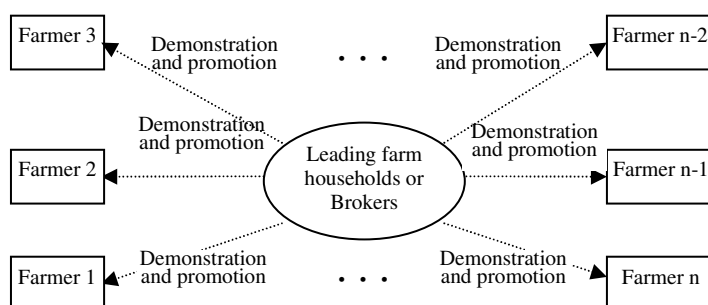


Figure 12 The structure of leading households and brokers demonstration model.

(7) International cooperation antipoverty model

With this model, relative state ministries or committees cooperate with international organizations such as The United Nations Development Program to provide information services. This model, mainly taking the form of pilot projects, supports poverty regions to establish information agencies and organizations facing rural areas, to purchase information equipments, and to bring poverty-stroke areas out of poverty. So far, 5 antipoverty information centres, 10 antipoverty information stations at township level, and 22 information points at village level have been established in 5 poverty counties located in Chongqing and Anhui.

2.2 Typical Technical Models of Agri-Informationization

In general, types of technical models are used for the agri-informationization in China, including: the traditional technical model, “3 webs in one” model, “3 electronic tools in one” model, “sky and earth in

one” model, “3 web plus 1 database” model, and “3G mobile” new model, namely, “3 electricity coupled plus 1 machine” model (Huang 2006; Wang et al. 2006; Wang 2007). Each model has its own features, advantages and disadvantages, therefore, should be selected according to the local conditions and the local user demands.

(1) The traditional technical model

With this model, traditional media such as newspapers, magazines, books, blackboard, radio and television are used for agri-informationization. Although no modern technology used with traditional model, due to the limitation of being under-skilled and undereducated of farmers and the shortage of modern information equipments, tradition technical model is still the main and valid model for mountainous regions and especially for the West-Middle China. Furthermore, the traditional model should not be ignored even in the Eastern China, and could be a valid supplement of the modern technical model.

(2) “3 networks in one” model

With “3 networks in one” model, telecommunication networks, Internet, and radio and television transmission networks are used in comprehensive and optimized way, to establish full-digital linking network systems and multi-media information networks which are with broadband information exchange and transmission, integrated professional works, and intelligent management and control. Through this multi-media information network, information services such as voice, data and video services are provided to users.

(3) “3 electronic tools in one” model

As mentioned above, with this model, the three electronic tools such as telephones, televisions and computers are integrated together in a valid way for agri-informationization. Currently, this is the main model strongly promoted by the Chinese Ministry of. It is suitable for the regions or groups with nice network infrastructure, high and urgent demands on information and advanced information technology.

(4) “Sky and earth in one” model

Here, the sky means satellite communication technology, while the earth means ground transmission technology. This model takes the full advantages of satellite transmission technology such as broad covering areas, low operation cost, and without time limitation. Meanwhile, satellite transmission technology, ground transmission technology and the technology integrating the above two are combined to contribute into the practical rural information service platforms with a low cost.

(5) “3 networks plus 1 database”

This model was initiated as a technical solution for electronic government (e-government). Unlike those three networks in “3 networks in one” model, here the three networks mean internal networks, specific networks and external networks. All of them are based on Internet. The databases are information resource databases, which are similar to the databases in “3 electronic tools in one” model. The focus of “3 networks plus 1 database” model is to provide security technology solution program for the utilization of information resources.

(6) “3G mobile” model

3G mobile, namely third generation mobile, is the new generation of movable communication system. It provides multiple information services such as image, voice, web browser, telephone conference, information querying, etc. “3G mobile” model is possible to develop as an important and prospective

technology model of agri-informationization, namely, “three electronic tools coupled plus a machine” model (with telephone, TV, computer and mobile).

3 PROBLEMS AND CHALLENGES FOR AGRICULTURAL INFORMATIONIZATION IN CHINA

Although great achievements have been achieved, certain problems with agri-informationization exist and need to be solved urgently, including (An 2005; Sun 2005; Liang 2006; Lu 2006; Wang et al. 2006; Wen 2006; Lu 2007a; Lu 2007b):

- Problems with the market mechanism of rural information. Currently, the leading role is played by the government in the construction process of agri-informationization. The breadth and depth that enterprises involve in the informationization construction is far from being adequate, while farmers have limited smooth channels and limited motivation to participate into this great and historical process. If these problems fail to be resolved, agri-informationization could not obtain health development. Meanwhile, it brings serious problems with the mechanism development of investment and finance for agri-informationization. Currently, the investment channels and the manners of supervision and service are far from complex and perfect.
- Problems with the production mechanism of rural information contents. The agri-informationization in China mainly focuses on infrastructure construction. The current information content construction still stays far from the real demands. Meanwhile, the localization of information content processing is a crucial problem to be resolved. How to collect local information and to transmit them in a timely, precise and suitable way is a big challenge in the future.
- Problems with the standardization of agri-informationization. 80 code standards about information classification have been issued in China so far. However, there is still no a code standard for agricultural information classification. This leads to problems such as: information and data are collected, coded and preserved in different forms instead of unit forms. Therefore, there is much less possibility to exchange and share information.
- Problems with the manners of motivating and organizing farmers. Generally, Chinese farmers are with low education level and weak capability in receiving and using information. In other words, most Chinese farmers have serious faint knowledge and weak consciousness about market and informationization, and limited capability to obtain or use information, How to motivate, organize and train farmers in a valid way and help them participate into the great process of agri-informationization as both information providers and users is a challenge, which would decide the effectiveness and efficiency of agri-informationization.
- Problems with finance and human resources. Information services rely on modern communication tools. However, finance and equipment shortage exist broadly. This leads to backward information collection and procession, and low level of information service. Besides, human resources for informationization are in critical shortage. Furthermore, many of them are with out-of-date knowledge structure, difficult to fit the new and complex demands, therefore far from being truly qualified. Both finance and human shortages are particularly critical at township and village levels. Many information services are difficult to be continued after the starting investment due to without further financial and intelligent support.

4 CONCLUSION

First, the agri-informationization has been successfully initiated and achieved partial successes in China. In this process, some information service models and information technical models are found and used by various governments, companies or farmers. They are proofed in real life to be effective for the Chinese agri-informationization.

Second, there is still a long way to go before the final realization of agri-informationization in China. Therefore, it is meaningful to generalize timely the various service models and technical models for further extension. We wish these models summarized above be meaningful references for multiple stakeholders, including police-makers, basic-level officers, farmers, and information companies in China or in other developing countries. However, every coin has two sides. These models should be studied and selected carefully, and be promoted directly, or with mixed models, or with revise according to local situations and farmer demands. Besides, new service models and technical models could appear with the rapid development of modern information technology and social economy.

Third, these information service models and information technical models were found and used by different bodies, including governments of various levels (the village level, county level, provincial level and national level, etc.), companies and farmers. However, so far, the Chinese agri-informationization is mainly government-leaded. We can expect that various bodies instead of one or two should be stimulated to contribute into the agri-informationization. And it should be farmer-oriented and market-oriented at the end.

Going through the three historic phases, namely, the primitive, the traditional and the modern agriculture, today's agriculture is heading to information agriculture in twenty-first century. By agri-informationization, the traditional agriculture in developing countries can be expected to jump into information agriculture with a leap frog development. And types of information service models and technical models will contribute into this historic process.

Finally, we wish the problems and challenged revealed above get highly attention from experts and practitioners at home and abroad.

References:

- An, X. (2005). Probe on theoretical basis and development mechanism of rural informationization. *Modern information* (in Chinese), 25(3):24-25.
- SCLGPO (2007). Status of poverty alleviation and development in rural China. China State Council Leading Group Office of Poverty (CSCLPO), Beijing.
- Huang, H. (2006). Probe of agri-informaionization and its realizing manners in China. *Economy and exploration of sci-technology information* (in Chinese), 16(5):91-93.
- Liang, J. (2006). The status and technical countermeasures for the construction of new countryside in China. *Journal of Nanjin Agricultural University* (in Chinese), 25(6):27-38.
- Lu, G. (2006). Research on main bodies of agricultural and rural informationization. *China's information world*(in Chinese), 12(1):46-48.

- Lu, G. (2007a). The rural information organizations and their structure administration based on capital accumulation in rural China. Post-doctor report.
- Lu, G. (2007b). Report on the agricultural and rural informationization in China (2006-2007). CCID Consulting Co. Ltd.
- Sina news report (2007). The rural-urban income gap is widening The income ratio is 3.28:1 in the last year. <http://www.sina.com.cn>. Accessed on 16 November 2007.
- Sun, C. (2005). General situation of agricultural information technology and countermeasures in China. *China Science and Technology Information* (in Chinese), 24(12):166-167.
- Wang, D. and Wang, W. and Min, Y. (2006). Pattern and application of information service in rural China. *World agriculture* (in Chinese), 8(1):15-18.
- Wang, Y. and Zheng, Y. and Wang, F. et al (2007). Application of RFID-based traceability system of safety and quality information through the whole supply chains and networks of multi-regional pork. *Agricultural Network information* (in Chinese), 8+:54-60.
- Wen, T. (2006). Problems staying with the agri-informationization when the government withdraws. www.ruralchinawatch.org. Accessed 02 December 2007.
- Wen, X. (2006). The current situation and the development of traceability application. <http://bbs.ancc.org.cn/dispbbs.asp?boardID=21&ID=2922&page=1>. Accessed 06 November 2007.
- Zhong, Y. (2004). Case study on information service in rural China. FAO report. <http://202.127.45.55:7001/pub/agri/ztl/xgzjyj/foxxfw/index.htm>. Accessed on 16 November 2007.

