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Exploration of Rural Informatization and Urban-rural Information Fusion

HE Wei*

Library of Chongqing University of Technology, Chongqing 400054, China

Abstract Based on the status quo of rural informatization and information service, this article conducts analysis and discussion of problems in rural informatization and urban-rural information fusion, using statistics. And corresponding countermeasures are put forward as follows: building rural information platform; strengthening information literacy training in rural areas and cultivating new farmers; making information network serve production and operation to increase jobs and income for farmers; developing rural e-commerce; enhancing network information security and prevention.

Key words Rural informatization, Information service, Tri-networks integration, Urban-rural information fusion

With the development of network, rural informatization has gone through from project "extend radio and TV coverage to every village" in the early years to the subsequent "information to the countryside"; from large-scale information infrastructure building, to establishment of the information service platform, and to realization of the intelligence production and management. In the future, rural informatization will move toward integration. Urgent demand for market information requires information resources and service platform to be integrated; rural information service means to be integrated; urban and rural informatization to be integrated.

1 The status quo of rural informatization

1.1 Connotation of tri-networks integration The so-called tri-networks integration, in a narrow sense, is the integration and convergence of telecommunications network, cable television network and computer network; broadly speaking, is the integration of telecommunications, media and IT. From the perspective of service providers, it means that different network platforms tend to carry substantially similar business; in terms of the end users, it means the convergence of the consumers' user devices such as telephone, TV and PC^[1]. Usually tri-networks integration is a socialized saying to much extent. At present,

it does not mean the physical unity of the telecommunications networks, computer networks, and cable television networks, but mainly refers to the integration of high-level business applications. The manifestations are as follows: in terms of technology, they tend to have more uniformity; in terms of the network layer, they can achieve interoperability, to form seamless coverage; in terms of the business layer, they penetrate and cross each other; in terms of the application layer, they tend to use unified IP protocol; in terms of operation, they compete and cooperate with each other, moving toward the same goal of providing diversified, multi-media, and personalized services to human; in terms of the industry regulation and policy, they also gradually become unified.

1.2 Information of Internet users Through the development of "tri-networks", there is an increase in the number of Internet users using mobile broadband. According to the latest statistics of CNNIC, as of June 2010, the number of overall netizens reached 420 million, surpassing 400 million mark, increasing by 36 million compared with that at the end of 2009; the popularization rate of Internet climbed to 31.8%, increasing by 2.9 percentage points compared with that at the end of 2009^[2]. The application of Internet in rural areas is gradually deepened, and the demand for the Internet is growing.

Table 1 The proportion of all kinds of Internet users to total Internet users

Time	Region		Mobile telephone		Occupation				%
	Urban areas	Rural areas	Urban areas	Rural areas	Urban workers	Rural workers	Students	Others	
December 2009	72.2	27.8	69.2	30.8	55.7	2.8	28.8	12.7	
June 2010	72.6	27.4	71.1	28.9	58.1	4.7	30.7	6.5	

Note: Data are from China Internet Network Information Center (CNNIC).

1.3 Information use structure in urban and rural areas

As of June 2010, the number of rural Internet users reached

115.08 million, accounting for 27.4% of number of total Internet users, with growth rate of 7.7% within six months; the number of urban netizens reached 304.92 million. It can be seen from Table 1 that subject to low level of socio-economic development, inadequate Internet access, obsolete hardware and equipment and other factors, the number of Internet users in rural areas grows slowly, with rate lower than that of urban

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* Corresponding author. E-mail: hw@cqut.edu.cn

areas. It is noteworthy that the current program of tri-networks integration has been approved, starting to be promoted in some rural areas, which will change the development of Internet in rural areas substantially. The number of rural netizens in the future is expected to grow rapidly.

It can be seen from Table 2 that there is a rapid increase in commercialization degree among China's Internet users, and especially the business class application is prominent. The growth rate of semi-annual users in online payment, online shopping and online banking averages about 30%, which is far more than that in other types of network application. The e-commerce application in the small and medium-sized enterprises tends to be popularized. The Internet, as a comprehensive platform, also becomes the conventional source of rural in-

formation and convenient channel of trading of agricultural products. The business transactions of agricultural products through the network become more and more realistic. Farmers can take advantage of the Internet to develop new products, innovate upon new technology, search information, and sell new products. It becomes another channel for yield increase and income increase in rural areas.

1.4 The allocation of information resources The distribution of information resources in the eastern, central and western regions has always been uneven, as shown in Table 3. The shortage of IPv4 now can be addressed using IPv6, but other resources remain to be improved. Uneven distribution of information resources in the eastern, central and western regions affects the development of rural informatization today.

Table 2 Usage rate and ranking of various types of network application

Types of network application	Usage rate in December 2009//%	Usage rate in June 2010//%	Ranking in December 2009	Ranking in June 2010
Online music	83.5	82.5	1	1
Network news	80.1	78.5	2	2
Search engine	73.3	76.3	3	3
Instant messaging	70.9	72.4	4	4
Online game	68.9	70.5	5	5
Network video	62.6	63.2	6	6
Electronic mail	56.8	56.5	8	7
Blog application	57.7	55.1	7	8
Social networking sites	45.8	50.1	9	9
Network literature	42.3	44.8	10	10
Online shopping	28.1	33.8	12	11
BBS	30.5	31.5	11	12
Online payment	24.5	30.5	13	13
Internet banking	24.5	29.1	14	14

Note: Data are from China Internet Network Information Center (CNNIC).

Table 3 Basic data of Internet access in various regions in June 2010

Region	The proportion of the number of IPv4 addresses		Domain name		Website	
	Quantity	Share in the total number//%	Quantity	Share in the total number//%	Quantity	Share in the total number//%
Entire country	250 000 000	100	11 210 000	100	2 790 000	100
Beijing City	52 500 000	21.0	2 319 472	20.7	371 579	13.3
Guangdong Province	24 250 000	9.7	1 211 749	10.8	396 536	14.2
Zhejiang Province	13 500 000	5.4	806 391	7.2	263 928	9.5
Shandong Province	12 750 000	5.1	448 231	4.0	129 734	4.7
Shanghai City	11 750 000	4.7	825 961	7.4	244 577	8.8
Sichuan Province	6 750 000	2.7	255 928	2.3	62 584	2.2
Hubei Province	6 500 000	2.6	247 427	2.2	61 786	2.2
Chongqing City	4 000 000	1.6	117 622	1.1	46 085	1.7
Shaanxi Province	4 250 000	1.7	109 698	1.0	40 536	1.5
Anhui Province	3 750 000	1.5	110 782	1.0	30 734	1.1
Yunnan Province	2 500 000	1.0	46 415	0.4	13 398	0.5
Xinjiang Province	1 500 000	0.6	26 604	0.2	4 496	0.2
Gansu Province	1 000 000	0.4	21 834	0.2	6 330	0.2
Tibet	250 000	0.1	6645	0.1	1 915	0.1
Others	104 750 000	41.9	4 655 241	41.5	1 115 782	40.0

Note: Data are from China Internet Network Information Center (CNNIC) and Asia-Pacific Network Information Centre (APNIC).

2 Problems in current rural informatization and urban-rural information fusion and countermeasures

2.1 Building rural information platform Since the devel-

opment of information technology in rural areas, rural infrastructure has been greatly improved: "Information Countryside Platform" established by China Telecom in 20 southern provinces; China Mobile's Integrated Information Network; China Unicom's 3G video, peaceful rural areas, distance education

for party members in rural areas, farm machinery remote control system^[3]. Therefore, 71.1% of the urban and rural mobile phone users surf the net half a year. From Table 1, 2, 3, we can find that there is little change in the informatization platform; the allocation of resources is uneven in urban and rural areas, in the eastern, central and western regions.

Therefore, in the construction of rural information platform, the government departments, enterprises, and institutions should provide a shared platform, to integrate the information suitable for rural Internet users, and provide high-quality services in a convenient and easy way.

First, the government should greatly increase capital input, for example, if AGIUCO-LA wants to improve public information service system in rural areas, the government should invest stably and sufficiently, which is an important guarantee for efficient information sharing in rural areas^[4]. Second, the government should establish public information platform. The platform should provide a variety of affordable paid information services to anyone without discrimination in geographic location, quality, and charges. Third, the information should be balanced. It should implement the "full and open" sharing policies; based on rural informatization needs, take increasing farmers' income as the main purpose. Fourth, the redundant construction of the information platform should be solved. All areas should carry out centralized management of agricultural information services; focus on the information service, actively promote and create new service mode. Fifth, "popular intelligent terminal + 3 G network + information application platform" will become an effective mode of information services in rural areas. The construction of an ideal information platform needs many-sided efforts.

2.2 Strengthening information literacy training in rural areas and cultivating new farmers Entertainment ranks first in network services, most of which is music and games. The people using the network in rural areas are concentrated in the young people, and the number of young netizens is close to 200 million. The mobile phone becomes the first tool for surfing the net^[5].

Farmers' information literacy means farmers' ability to find and obtain information, absorb and use the information content, to meet their own information needs^[6]. In the case of economic pressure and difficulties in finding jobs, all the time rural Internet users work outside the home after graduating from junior high school. The young Internet users lay more emphasis on entertainment, far away from the function of information knowledge. In order to increase farmers' income and their employment opportunities, we should guide them to rationally use information resources, and improve their own information literacy to take the road of science-based and information-based road.

2.2.1 Strengthening education and training for promoting cultural and technological quality and capacity. The government should play a leading role to put the development of rural education on the top agenda, and continue to consolidate compulsory education. Relying on the industrial development, it should carry out the practical technical training and vocational skills training for farmers, and establish sound education training and

information service system.

2.2.2 Strengthening free education of network knowledge for rural youth. The government should strengthen network information literacy education for rural youth, and carry out various kinds of free professional skill education. It should unite with enterprises to bridge the information gap between urban and rural areas, and make a lot of useful attempts to promote the new rural construction. For example, Ministry of Industry and Information Technology of the People's Republic China cooperates with AMD, to establish "Rural Integrated Information Service Training Center" in many areas, which has played an exemplary role, to some extent solving the predicament of rural information knowledge shortage and informatization talent shortage^[7].

2.2.3 Cultivating new farmers. As for the training for rural information technology personnel and farmers, it should not be only the training for ability to use computer, and the ultimate goal of rural informatization is to train farmers to become educated, skilled, new farmers who are adept at operation, in order to provide sufficient human capital and new impetus for China's economic and social development, thus it is required to open farmers' mind and promote farmers' quality in a larger scale, at a higher level, and in more areas.

2.3 Making information network serve production and operation to increase jobs and income for farmers Developing the rural areas, increasing farmers' income and enriching farmers, have been inseparable from the network of information resources. Due to asymmetry of urban and rural market, we should make farmers' smallholder production linked with big market, to increase farmers' income.

2.3.1 China's Computer Subsidy Program for Rural Areas makes farmers see the benefits of informatization. However, computer is regarded as a high-tech product, and if without ancillary services and measures, it will be difficult for farmers to truly master the computer skills, fundamentally promoting the development of informatization in rural areas. Rural informatization is a long process, and we should endeavor to promote the guidance and assistance in the get-rich practice for farmers. We can enhance the integration of production, supply, marketing, using the benefits springing from the information-based means. Farmers search the purchasing and marketing information of grain through the network, and keep effective communication with the outside world by means of information-based means, ultimately expanding grain sales and achieving increase in income.

2.3.2 All colleges and universities invest in running schools in the suburbs and counties to expand education. Library, as the forefront of information-based development, has conditions and obligations to support the construction of rural informatization. First, universities can use their own resources, to help organize short-term training courses in rural areas. Second, promoted by tri-networks integration in rural areas, surfing the net using mobile phones is convenient. As the WAP content server stores service information, the library can use the WAP communication mode, the bridge connecting wireless mobile communication network and the Internet, for rural mobile phone users to access and use library resources through WAP.

2.4 Developing rural e-commerce Yield increase and in-

come increase rely on the information symmetry in rural areas. The advent of Alibaba, Nonging, and other web sites, has subverted the global retail industry, especially the traditional trading patterns of agriculture, forestry, animal husbandry and fishery. Agricultural e-commerce has become a necessary means to exploit new markets and participate in the global competition^[8]. Through the network, the farmers can conveniently and rapidly complete credit, guarantee, transactions, payments, foreign exchange and other links. The network can make farmers closer to the market, and quickly make us know consumers' preferences, buying habits, and consumer demand, thereby contributing to the prosperity and development of agricultural trade.

2.4.1 Cultivating farmers' awareness of business. Now the problem is not technology, capital, and service, but ideological change and update of management philosophy. The agriculture-related enterprises and leadership in China generally lack knowledge on information technology and e-commerce, restricting the development of agricultural e-commerce. Only by changing the ideas of farmers and managers of relevant government departments, can we promote the further development of agricultural e-commerce.

2.4.2 Developing the flow of information. In the information age, those who first obtain information and first use information, will be able to obtain markets, and profit. Information needs show the following characteristics: comprehensive systematicness, comprehensive integration, normativeness, continuity, regional and seasonal differences, timeliness^[9]. The agricultural information service should be well directed, timely, and convenient, with low cost; after the use of the agricultural information service, the economic efficiency will be high. In the context of soaring urban and rural online payments, we should establish safe exchange of cash.

2.5 Enhancing network information security and prevention

2.5.1 National network security issues. In 2009, half of Internet users experienced network security incidents, and the service expenses of Internet users dealing with the security events reached 15.3 billion yuan in total. Virtual property damage becomes one of the major economic losses in the network, and the virtual property protection should be urgently strengthened. Over 90% of Internet users encounter phishing sites, and web download and browsing becomes the main channel of the

spread of viruses and Trojans. The degree of attention paid to the network security events is significantly enhanced. The Internet users' sense of security declines, and they are more careful than ever to provide online personal information. Nearly 21 million Internet users lack awareness of the protection of the password settings. 99% of Internet users all take certain precautions for the personal computer. Nearly 70% of Internet users realize that the personal network security issues can influence the public network and the safety of others. 28.4% of Internet users have never heard of or paid attention to the integrity identity of web sites, so the publicity and promotion efforts need to be strengthened. Nearly half of Internet users do not attach importance to online security bulletin, easily triggering network security incidents. 71.2% of Internet users have heard of the concept of "cloud security", but only half of Internet users are willing to try it^[10].

2.5.2 Cultivating rural Internet users' safety awareness. Government should step up safety management efforts, and strengthen network security education for farmers through various channels to improve safety awareness. It is the most practical way at present. Strengthening the anti-virus awareness to check and kill the virus is a necessary means to ensure the security of network systems.

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it is necessary to use other methods for research, and the basic research content remains to be further sorted.

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