

Thought on the Dual Contradiction in Human Resources of Agricultural Information ——Taking Hebei Province as Example

Aiying Liu

School of Business Administration, Hebei University of Economics & Business
47 Xuefu Road, Shijiazhuang, Hebei Province, China 050061

Abstract - The construction of agriculture informatization is experiencing its key phase, during which the main developing direction is changing from infrastructure construction to the increase of integrating service functions. At present, the main problem is the dual contradiction between the lack in total amount of agricultural information's human resources and its unbalanced structure. This paper makes a systemized analysis to the situation of agricultural information's human resources, explores an available way of leading the development of agricultural information by human resource strategy, thus realizes an important and practical significance of facilitating the innovation in model of construction on agriculture informatization, as well as promoting agricultural development, rural economy and social improvement.

Keywords- human resources of agricultural information; lack in total amount; unbalanced structure; thought on countermeasure.

1. Introduction

The research on agricultural informatization was started in developed countries earlier, and many major achievements on it were made, but the researching results on human resources of agricultural information were hardly seen. In China, concerning research and study were started during middle and late period of 1990's, and the development went faster after 21st century began. The researching content in China was focused on several aspects as follows: the connotation and evaluation of agricultural information's human resources, analysis on effect of human resource in agricultural informatization, training model of agricultural information's human resources, etc. But there were little systemized positive analyses could be seen though some researching results involved in the problems and countermeasures of agricultural information's human resources in China.

The construction on agricultural information's human resources always exerts a basic effect very important to the informatization of agriculture. Facing the dual contradiction between the lack in total amount of agricultural information's human resources and its unbalanced structure, this paper takes Hebei Province as example, utilizes the method of system theory, makes analysis to current situation and forming reasons of agricultural information's human resources, explores paths and ways from many levels, thus to expect a promotion to the healthy and continuous development in agricultural informatization.

2. Basic situation of agricultural informatization and human resources of information in Hebei Province

2.1. Continuous and fast development on construction of agricultural informatization

Along with the improvement on construction of agricultural informatization in whole China and the implementing of "Jin-Nong Project" (Golden Agriculture Project), agricultural informatization in Hebei Province has been developed largely since the tenth five-year plan was started.

1) Agricultural informatization achieved an outstanding effect on its infrastructure construction.

In whole province of Hebei, an agricultural information supplying system has been established, in which the Hebei Agricultural Information Center is the hub, province-affiliated agricultural departments are linked with broadband communication, every city, county and township is covered in the network, villages and rural families are connected by many channels such as “Agricultural Technology Electric Wave Goes into Peasant Houses” and vocal telephones.

2) Integration and development of information resources achieved initial successes.

In whole province of Hebei, an information transmitting network was integrated, in which 12 province-affiliated agricultural departments, 11 municipal cities and 136 counties were covered. An unified network platform of Hebei provincial agricultural information was formed. This system connected 34 agricultural products wholesale markets, 1450 leading enterprises, 4500 intermediary agents and more than 100000 large professional operators and brokers.

3) The development and application of modern agricultural information technology were promoted.

Taking the increasing contents of agricultural technology as main purpose, Hebei Province sped up the development on advanced technologies such as 3S—GPS(Global Positioning System), RS (Remote Sensing) and GIS(Geographic Information System)—and artificial intelligence, thus achieved certain applications of these technologies in formula fertilization, cultivation of poultry and livestock, flood and drought preventions, weather prognosis and afforestation.

4) Agricultural information servicing capability is improving stably.

In recent years, for resolving the problem of information capability, concerning departments throughout Hebei Province took agricultural information network as supporting base, fully utilized modern transmitting media such as computer, television, telephone and information machine, integrated and applied information resources effectively, sped up the extension of network and the progress of “information entering villages”. The province already utilized internet and industries with local characteristics to established a lot of websites with agricultural specialties, such as China Chili Net, Chinese Date Net and Special Wheat Net, promoted the development of local economy and the income of peasants.

2.2. Main working teams of agricultural informatization formed basically.

In 11 municipal cities of Hebei Provinces, market information departments or information centers were established, among which, information centers in 9 municipal cities were ratified as government’ s offices by the authorities. More than two-thirds of counties (cities) established information centers and stipulated their organizations; according to the Ministry of Agriculture’s standards, nearly one half of townships established agricultural information service stations on the bases of townships’ agricultural affairs offices, rural economic working stations and agricultural technology working stations. For resolving the problems of lacking agricultural information’s professional personnel and maladjustment between professional quality and working position, Hebei Province adopted the method of “provincial and municipal governments take charge of enhancement, county and township governments take charge of popularization”, trained professional personnel of agricultural information in periods and batches, especially organized training on basic knowledge to information operators in counties of agricultural investigating base points and agricultural wholesale markets, thus to increase basic computer knowledge and applying skill of information operators, and formed a team of professional personnel with certain level of quality. At present, in whole province, there is a mainstay of agricultural information service team with 30 members on provincial level, 220 members on municipal level, 1400 members on county level and more than 9200 village information operators. [1]

3. Main problems of agricultural informatization’s human resources and forming reasons

3.1. General characteristics of agricultural informatization’s human resources

Main problems of agricultural informatization’s human resources are: grievous lack in total amount of human resources, unbalanced distribution of personnel in regions and levels, lack of information service personnel on basic level, lack of middle and high level of personnel who can achieve creative and thoughtful development on agricultural information, innate deficiency of working personnel’s knowledge structure, etc.

Human resources in such condition, which shows the characteristics of lack in total amount and unbalanced structure, already became the fatal defect in development of agricultural informatization. According to Statistics Public Report of Hebei Province and Hebei Rural Statistics Annual of years 2003-2008[2], here a quantified measurement is made to the level of Hebei Province's agricultural informatization by utilizing AHP (Analytic Hierarchy Process) to establish evaluating index system and evaluating model. The results show that, in the factors system constituted by infrastructure index, technology popularization and application index, subjective environment index and agricultural informatization's human resources index, the agricultural informatization's human resources index has been always lower than the general index of agricultural informatization. Although the contributing rate of agricultural informatization's human resources has been increasing since 2007, concerning figures were ranked at the end of row and lingered within negative value area for a long time.

TABLE I AGRICULTURAL INFORMATIZATION INDEX OF HEBEI PROVINCE 2003-2008

Name of Index	2003	2004	2005	2006	2007	2008
Amount of Agricultural Information	100	114.34	132.36	158.53	177.67	242.60
Equipment of Agricultural Information	100	130.91	186.75	264.74	346.11	444.71
Human Resources of Agricultural Informatization	100	94.29	105.54	104.59	165.99	183.40
Main Level of Agricultural Information	100	108.81	117.58	126.23	133.90	143.70
General Index of Agricultural Informatization	100	115.16	145.02	182.25	234.36	291.43

Note: For resource of data in above tabulation, see report of Strategic Research on Agricultural Informatization in Hebei Province under this subject.

3.2. Positive analysis on dual lacks in agricultural informatization's human resources

The agricultural information service network already formed basically on its provincial, municipal and county levels, but in most townships, central stations (working points) have not been established. Agricultural information system of Hebei Provincial Agriculture Office (or Bureau) acts a leading role for promoting agricultural informatization and developing information service in whole province. Its current condition: there are 16 full time working personnel in Hebei Agricultural Information Center; and in 11 municipal information centers, there are 77 staff members. Among which, 55 persons are full time workers and 22 are part time employees. In 158 counties, there 632 staff members, and among which, 474 persons are full time workers and 158 are part time employees. Respectively, three levels of personnel are 26.67%, 35% and 45.14% of same levels' agricultural information workers[1]. This system shows a certain significance of representation to agricultural information's human resources in Hebei, so this paper takes it as sample to carry out the analysis combining with actual demands of this province.

1) Personnel of agricultural information on basic working level are in lack

At present, there are 11 municipal cities, 158 counties, 1961 townships and 19075 villages in Hebei Province[2]. After a rough reckoning by consulting Handan city's "Construction Project of Ten Thousands Agricultural Information Operators' Team", it's estimated that, within five years, Hebei would need to increase its professional personnel of agricultural informatization on basic levels in amount of more than 100,000. If we make the reckoning based on a standard of allocating 2 professional workers to every township and 1 worker to every village in whole province, it's estimated conservatively that nearly 4,000 professional staff will be needed even if the service centers merely on level of township are established and completed. For achieving the triad service model of integrating rural education, popularizing technology and developing information service, when the agricultural information consulting service is permeated on level of village,

more than 15,000 professional workers would be needed. And at present, more than 20,000 professional staff for basic working level are in urgent need for implementing the extending construction of agricultural information service network. In most townships, agricultural informatization services are in a condition of "off-line". This problem is not only one of important evidences for explaining the persistent ailment of "the last kilometer" in agricultural information service, but also a side reflection to the deep contradiction of unreasonable flowing direction of agricultural technical personnel.

2) Unbalanced general allocation of agricultural information working staff

First, agricultural information's human resources are in an unbalanced regional allocation: it's obviously better in economy-developed regions than in under-developed regions, and especially, allocating conditions in cities such as Shijiazhuang, Baoding, Langfang and Tangshan are much better than other regions. This fact indicates that cultivation and storage of professional staff in whole Hebei Province have both practical and late-developing advantages. But in under-developed regions, lack of professional staff already became a main bottleneck for agricultural informatization's construction. Secondly, there's a obvious difference of agricultural information working staff's quality between levels of municipal city and county. The education degree of professional and technical personnel in municipal organizations is generally higher than staff in county-level office. Among professional technicians in municipal organizations, 48.83% are in bachelor's degree or above, and 39.53% have college diploma. In county-level office, 34.97% of professional technicians in bachelor's degree or above, and 42.24% have college diploma. In addition, amount of professional and technical personnel with bachelor's degree or above in cities such as Shijiazhuang and Tangshan is higher than cities such as Zhangjiakou and Chengde by 3%[1]. This difference is in positive correlation with the discrepancy of regional economy-developing degree, which indicates the agglomerating effect of economy and social environment to agricultural information's human resources.

3) Innate deficiency of working personnel's knowledge structure

Just like other provinces in whole China, construction of agricultural informatization in Hebei started late but developed quickly. After new century began, along with the acceleration of whole China's construction on agricultural informatization and the implementing of "Jin-Nong Project" (Golden Agriculture Project), agricultural informatization in Hebei developed rapidly and achieved remarkable results. But due to the limitation of various conditions, the cultivation to agricultural informatization's working staff is backward badly. At present, professional and technical personnel of agricultural information service mainly majored in agronomy, agricultural economy, computer information, library information or foreign languages. Limited by the knowledge domains of specialties, staff's professional quality cannot meet the demands of complex knowledge structure that requires agricultural information service to melt agricultural technology, agricultural economy and modern information technology into one unity. Research on Development of Agricultural Informatization made an investigation on demand of training by information service staff on levels of municipal city and county, which indicates that, 84.02% of staff chose to reinforce their information processing skill, 74.56% wanted to supplement the computer application technology, and 56.21% hoped to replenish their knowledge of agricultural technology[1]. This severe fact also heckles and challenges government's human resources developing strategy and modern education of China.

4) Unbalanced inner structure of agricultural information's human resources

Working staff of agricultural informatization is generally considered to include managing personnel of agricultural informatization, developing personnel of agricultural information resources, researching personnel of agricultural information technology, popularizing personnel of agricultural information. Levels of working staff are divided into several types such as study and research, engineering and technology, application and popularization, which classifying system is in a shape of pyramid. In Hebei province, a remarkable problem in the structure of agricultural information's human resources shows a lack of leading persons for whole industry (including senior programmers, system analysts, senior network designers, senior E-business operators, senior information security auditors, senior information managers, etc), serious out-flowing of high-level and mid-level professional personnel undertaking creative development, and short of information security experts. Especially the team of high-level staff, which represents the integrated degree and synthesized strength of informatization in a enterprise or region or whole province, always influences the integrated progress of Hebei's agricultural informatization with its level of synthesized quality. The out-flowing of high-level staff

also causes an immeasurable negative effect to the development of Hebei's agricultural informatization. The direct cause that formed this phenomenon relates closely to working environment and material benefits of agricultural informatization's personnel. On the questionnaire asked workers whether their working conditions and equipments could satisfy the requirement of agricultural information service, 64.49% of professional staff gave an answer of "NO". And 91.72% of respondents asked the government for offering a funds guarantee to agricultural information service by the way of public expenditure[1].

3.3. Exploration on the forming reasons of dual contradiction of agricultural informatization's human resources

1) Influence by two-factor structure of city and township

Viewing from the historical trend of social economy's development, we know that the industrialization is an indispensable stage of economic development and social progress in one country, which basic characteristic is transfer of social resources from agricultural domain to non-agricultural domain, and meanwhile, most of social wealth are produced by non-agricultural industry. After China entering the stage of industrial society, modern industry developed gradually and replaced agriculture as the main body of economic society and main resource of social wealth. Market system is becoming more and more completed, and already became a basic method for adjusting economic activities and implementing resources' allocations. At present, the proportion of agriculture in national economy is comparatively small and going into a stable state, thus entering a developing stage of "industry feeds back to agriculture, cities supports villages", but due to a long term of limitation by this two-factors economic structure, in the foreseeable future, it's difficult to make remarkable change to the situation that funds, technology and human resources gathering in large-and-middle-sized cities which possess obvious advantages of information resources.

2) Limitation by unbalanced finance of county and township under current system

Along with the reformation on tax system implemented during middle period of last century, controlling powers on finance were gathered into high-level national and provincial administrations, and affair-handling powers are delegated to lower-levels of departments, thus the public service items undertaking by governments of county and township are becoming more and more. In addition, after alleviating farmer's burden, capacity of transfer payment by higher authorities is insufficient, so the financial conditions of county government are in difficult situation, and township government is facing more difficulties. Only by the payroll finance, governments below county level are almost impossible to undertake the heavy duty of covering whole basic levels with agricultural information service.

3) Limitation by disjuncting between of education and development of social economy

Training and cultivation to agricultural information staff consists of two forms: systematic education and professional training. Mainly, systematic educations are implemented by relying on universities and colleges, while professional trainings are carried out by local schools of professional technology, correspondence courses attached to institutes of higher learning, training courses of local agricultural affair departments or professional organizations. At present, most of personnel cultivated by educational system are only equipped with skill of information technology, agricultural production techniques and knowledge of management on agricultural economy, which cannot satisfy the requirement of professional staff in compound type demanded by the development of modern agriculture, thus large scale of training and cultivation to middle-and-high levels of agricultural information working staff are influenced directly. As for the professional trainings that take agriculture information operators as main object, a characteristic of short term is very obvious. And the scope of training content is too narrow, training and technical methods are quite backward, training effect is not remarkable, effective supervising and evaluating organizations are also in lack, thus in some places, professional training to agriculture information operators on basic level is only a sideshow. Then one case should be taken with most importance: knowledge level of teaching quality and educating hardware in some professional training organizations are in serious lack, which would be the basic reason influenced training effect.

4) Complications due to lack of funds investment and bad working condition

The main resources of funds for agricultural information service on levels of county and city are self-raised funds and special financial subsidies, in which the self-raised funds occupy main part. This funds-raising method is influenced seriously by the regional economy's situation and financial income of local

government, thus short of investment's stability and continuity. Even worse, in service stations or service centers on level of township, which were established based on agricultural affairs offices, rural economic working stations or agricultural technology working stations, many operating departments are function-added organizations with original staff, condition, funds and organizing form unchanged. When Research on Development of Agricultural Informatization made the investigation on government's support and its degree required by basic level, 37.87% of respondents thought that they should obtain 100% of funds support from government, and up to 53.85% of respondents hoped the funds support from government to be more than 80%[1]. Lack of funds brought many problems such as low salary, bad working condition, lack of opportunities of learning exchange and further training, little achievement of career, which are indisputable reasons caused agricultural information staff flowed to cities or economy-developed regions.

4. Thought on countermeasure to construction of agricultural information's human resources

4.1. Choice on path for accelerating the construction of agricultural information human resources

Facing the pressures caused by lack of resources, relative overplus of agricultural population and comparative low capacity of integrated production, taking information technology as tool of breakthrough, leading high-tech and new-tech to penetrate into agricultural domain, this path is not only a strategic move to reinforce the basic position of agriculture and boost the construction of new village, but also a fundamental method to raise the capacity of integrated agricultural production and resolve problems of agriculture, peasant and rural area. Accelerating the construction of agricultural informatization is not only the objective requirement and important content for implementing the modernization of agriculture, but also an endogenous and actual demand for achieving the development of rural productivity and progress of rural economy and society, which based on a wide and deep social foundation.

The dual contradiction between the lack in total amount of agricultural information's human resources and its unbalanced structure, is an inevitable and regular problem that would occur when the agricultural informatization develops to certain degree, is also a difficulty or obstruction on the way forward, and its occurrence conforms to the general regulation of technology industrialization's development. The deep-leveled forming reasons of this contradiction involve many domains such as system and policy, economic level, technology education and social consciousness, which shows a systematic characteristic quite notable. So the practical choice on path for accelerating the construction of agricultural information human resources would be taking the scientific outlook on development as guideline and insisting on exertion of government's leading effect, then speeding the causative change in system positively and establishing a fine synthesized environment suitable for integrating, agglomerating and encouraging staff of agricultural information, thus to accelerate the steps of cultivation to compound-typed personnel with high quality.

4.2. Integrating scientific planning to propel the construction of system

First, systematic and completed prediction and planning to agricultural informatization's human resources should be achieved based on a height of strategy. Departments such as development and reformation, agriculture and forest, information industry, education and technology can organize experts to formulate long term or middle term of developing plan and relating policy, forming a highly unified layout for developing human resources of agricultural informatization with reasonable feasibility. Secondly, taking the requirement of "creative concept, practical concept, long term learning ability, manipulative ability and synthesized ability" to basic quality of working staff, and forming a basic knowledge structure consists of agricultural technology knowledge, information researching & managing knowledge, modern information technology and one foreign language[3], the hierarchical standard system of agricultural information's human resources in Hebei would be constructed. Thirdly, special managing method set individually for agricultural information professional staff should be tried, and a system for agglomerating and encouraging staff of agricultural information should be completed progressively, which consists of various items including professional qualifications, detailed employing regulations, evaluation to professional technical positions, examination to achievement and performance, continued education, salary system, regulations on reward and punishment as

well as appointment and dismissal. At the same time, problems such as institutional obstruction and omission of policy should be resolved positively and stably based on deep study to new situation and new case occurred in construction of system.

4.3. Increasing financial investment to promote an overall development

Degrees of financial investments from various levels of government should be raised largely, and the raising speed should not be less than the growing rate of financial quota. In years when financial income runs better, the investment can be added on a large scale, thus to produce driving effect, and lead government's financial resources and social funds gathering to construction of agricultural informatization. From now on, along with the progressive actualization on system of province-administrated county, financial difficulties in county or township will be improved to some extent, but facing the huge amount of investment for extending basic level of agricultural information service network to peasant households, difficulties still exist. Special fund of national and provincial finance should incumbently undertake historical missions that incline public finance and extend public facilities and cover public service to agriculture, peasant and rural area. For the government's financial investment, not only the infrastructure construction to agricultural information should be secured, but the investments to construction of agricultural informatization's human resources will be increased. Only after unified management and consideration are implemented, the optimal synthesized benefit of investment can be obtained.

4.4. Constructing fine condition to enhance overall quality

The construction of agricultural informatization relies on quality of professional technical personnel's team. In rural areas, huge emptiness of agricultural information's staff still exists. The key reason caused this deficit in structure is the lack of leading persons' team. Under the current situation that human resources trends towards big cities, to form the team of initial and middle levels of working staff, methods of "attracting by employment, enhancing by training, agglomerating by career" should be applied. By choosing excellent graduates of agricultural universities and colleges, then imitating the form that graduates from teacher-training institutes going to rural areas for educational assistance or getting employment, implement technical training to them on knowledge of agricultural information, thus to prompt relative professional staff flowing back to rural areas and consolidating basic levels. For higher level of talents, they can be cultivated or introduced in local areas, and meanwhile, the employing mode of hiring staff from other regions is also available, by which the regional staff's synthesized advantages would be exerted fully, only if the tenet of "useful without possession" is adopted. For a long term of consideration, a communication platform for agricultural information and technology shall be established, which combines long range training, technology consulting and service, scientific technology exchanging into one unit. This information platform can be also constructed on the base of agricultural technology educating network. In addition, for attracting and gathering various types of professional staff, their conditions of material life should be improved, and some opportunities of updating knowledge and exerting specialized talent such as further training, learning exchange and study abroad will be also created and supplied. A fine developing environment of career is the basic condition for attracting and cultivating talents.

4.5. Taking human education as fundamentality and exerting the effect of institutions of higher learning

High-leveled educating institutions, especially local universities and colleges, undertake the duty of supplying talents and technology for regional economy and social development. At present, even though some agricultural universities and colleges establish specialty of agricultural informatization, or set the direction of agricultural informatization for students studying courses of master's degree, but they attach most importance to cultivate high-leveled researching staff and some engineering technical staff with bachelor's degree. And more or less, the classification on specialties and researching directions are too rough, new students' enrolling scale is comparatively small, and the cultivation to large amount of staff in type of application with combined abilities of information's gathering, developing and consulting is neglected. For supplying powerful support to the construction of agricultural informatization, four points needed to be aimed: one, based on the structures of staff's quality and knowledge mentioned above, during education and teaching reformation, a system of

cultivating goals should be established and completed, which includes students studying high-leveled vocational school, or learning courses of bachelor's, master's and doctor's degrees. In this system, assignments of specialties and setting of courses should be adjusted, and the cultivation in form of order can be also applied according to requirements. Secondly, for the working staff on positions, multiple-formed continuous education should be proceeded under the principle of adaptation for working position and the aim of filling knowledge's deficiency. Third, according to the form and method of cultivation on master degree's students under environment of rural education, training courses in direction related to agricultural informatization can be established, and the salary as well as other material benefits can be same as of countryside masters. Training courses of the second educating experience can be established and taught to graduated students from agricultural universities and colleges, thus a group of talents in urgent need by construction of agricultural informatization would be supplied in short term. The fourth, education via internet can be realized, thus to construct a platform for widening and updating knowledge of professional personnel on basic levels, and develop or cultivate the information concept of peasants.

5. Acknowledgment

This research is one of projects under Hebei Provincial Social Sciences Foundation 2009 and the final result of Strategy Research on Agricultural Informatization of Hebei Province (No. HB09BLJ004). It is funded by Hebei Provincial Social Sciences Foundation, for which the sincere gratitude is presented here!

6. References

- [1] Fusheng Song, Banghong Zhao etc, "Research on Development of Agricultural Informatization". Beijing: China Agricultural Science and Technology Press, 2009. pp. 69–119
- [2] Office of Peoples' Government of Hebei Province and Statistic Bureau of Hebei Province, "Hebei Rural Statistics Annual 2009", Beijing: China Statistics Press, 2009.
- [3] Naixiang Li etc, "Discuss on Quality and Knowledge Structure of Agricultural Information Talents from Requirements and Subject Characteristics of Agricultural Informationization". Journal of Tianjin Agricultural University, 2006 (6), 13(2).