

AGRICULTURAL TECHNOLOGY EXTENSION SYSTEM IN CHINA: CURRENT SITUATION AND REFORM DIRECTION

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Abstract: This paper presents the evolution of China's Agricultural Technology Extension (ATE) System since its inception in 1920s. China's ATE system has gone through 5 stages before the current system was formed. It evolved from basic-level extension network in 1950s, mid-level extension organizations in 1960s, gradually into nation-wide extension system in 1980s. The participative extension network was reconstructed during "the Cultural Revolution" period. The reform of extension system of China has been intensified since 1992 and the five-level Agricultural Technology Extension organizations were basically established. Compared with those previous ones, the current extension system is much better in its setting hierarchy, functions and extension efficiency. However, at present, China's ATE system is also facing such problems as investment deficiency, low-quality and redundant extension team, failure to meet the market needs and government

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domination, etc. Based on these problems, some reform directions and measures to perfect China's ATE system are proposed.

Key words: evolution, China's Agricultural Extension Technology System, history, status quo, reform

1. THE HISTORY AND STATUS QUO OF AGRICULTURAL TECHNOLOGY EXTENSION (ATE) SYSTEM IN CHINA

1.1 History

The history of agricultural extension system of China can be traced back to 1920s when the agricultural departments of many universities set up extension sections by imitating the model of Land Grant College of the United States. For example, the department of agriculture and forestry of Jinling University established cotton extension section in 1920 and recruited an expert from the U.S Ministry of Agriculture to instruct cotton breeding research and localization of US cotton breed in China. The extension of the new cotton breeds was initiated and agricultural improvement methods were disseminated nation-wide. The first formal extension station came into existence in 1924, which was located at Wujiang, He County, Anhui province. The extension work was very popular with the local farmers, which provided a good basis for the establishment of agricultural experiment station later. The first law of extension, Regulation of Agro-extension, was enacted in October, 1929 and the central agro-extension committee was formed in that December.

After the establishment of People's Republic of China, the central government formulated a series of policies and administrative pronouncements to promote the construction of nation-wide ATE organizations. By mid-1950s, the comparatively complete ATE system had been established in China. Generally speaking, the ATE system has gone through 5 stages to adapt to the change of production relationship in rural areas and make explorative advancement in last 50 years:

Stage I: The basic-level network of agricultural extension was established (1949-1957). The inception of the basic-level extension network was centered on the county-based demonstration farm and based on the Mutual Help Group. Its cadres were model laborers and technicians. Later, the area-based ATE stations were widely established to form the extension-station-centered ATE organization system.

Stage II: The mid-level extension organizations were perfected (1958-1965). The extension organizations have gone through the process of staff reducing, consolidating, restoring and developing during this period. The county-level ATE stations were constructed and the specialization of agricultural technologies appeared in these extension stations. The specialized division of labor was practiced among these stations. The specific extension stations focused on agro-technology, seeds, soil and fertilizer, plant protection, agricultural machinery and husbandry were set up respectively.

Stage III: Participative extension network was reconstructed (1966--1977). All the extension organizations were paralyzed during the period of "Cultural Revolution". However, the extension organizations such as "four-level agricultural science experiment network" which refers to "county-run agro-science office, people's commune-run extension station, production team-run extension team and extension group created by Hua Rong County, Hunan Province", were extended nation-wide in the late 1960s and early 1970s, and the farmer technician team became stronger and stronger then.

Stage IV: New nation-wide agro-extension system was reestablished (1978-1991). With the implementation of reform and opening up policy and Household Contract Responsibility system in rural area, the rural development of China entered into a new historical era. The "top-down"

extension service system was reestablished then. The National ATE Station was set up by Ministry of Agriculture in 1982 and the county-level extension centers were strongly promoted with the integration of several specific stations such as agro-technology station, soil and fertilizer station and plant protection station to meet the requirement of management integration. The extension network led by county-level ATE center, linked with town-level agro-technology station, based on the village-level science-technological service group was gradually formed.

Stage V: Reform of agricultural extension system has been intensified (since 1992). With the intensification of economic system reform, agriculture of China was transformed from centrally planned economy to market economy. The extension system at the grass-roots level has gone through frustration and the situation of “no money, no network, no staff” even appeared, which necessitated the agenda of exploration of new modern extension system with the Chinese characteristics. The ATE Law of People’s Republic of China was enacted and implemented In July, 1993. Ministry of Agriculture established National ATE Service Center through the integration of the special extension stations -- the National ATE Station, National Plant Protection Station, National Soil and Fertilizer Station and National Seed Station. Meanwhile, some specialty extension organizations such as husbandry, aquaculture, agriculture machinery and agro-economic management were also gradually consummated. Now, the five-level (from central government to town-level) ATE organizations are basically established.

1.2 The status quo and characteristics of China’s extension system

1.2.1 Setting of ATE organizations and personnel arrangement

The state engendered extension system includes five levels (central government, province, prefecture or city, county and town). Among them, the county and town-level extension sections are basic-level extension institutions which are run by the local governments and provide service to local farmers directly. They can be divided into five systems, i.e. planting industry, husbandry and veterinary, aquaculture, agricultural machinery and economic management, according to their specialty. After 2006, economic management system no longer belongs to the extension system based on government policy. According to the statistics provided by Ministry of Agriculture (Du, 2003), by the end of 2003, the county and town level extension departments had 1,005,000 staff with 334,000 in the county and 671,000 in the town respectively.

1.2.2 Division of extension functions among basic-level extension organizations

The extension functions of basic-level extension organization were categorized into four types by agricultural departments according to their character (DU Qinglin, 2003): 1) the functions of law enforcement and administration such as animal and plant quarantine, inspection of husbandry, aviary and aquaculture, monitoring and inspection on agricultural machinery and management of farmers’ burdens, etc.; 2) pure commonweal services such as animal and plant disease and insect pest monitoring, forecasting and preventing, free ‘training and visit’ service for farmers, introduction, experiment, demonstration, extension of new technologies, monitoring and forecasting the safeness of pesticides and animal medicines, participating in the formulation and implementation of local extension plan and monitoring and reporting the disasters, plant growth and soil fertility, etc.; 3) intermediary services such as quality inspection on the agricultural products and means of production, production and sales information provision for farmers and identification of farmers’ professional skills, etc.; 4) dealing services such as dealing of agricultural materials, store, transportation and sales of agricultural products and special and best-quality agricultural products production and seed provision, etc..

1.2.3 Source of funding of agro- technology extension organizations

The state and provincial level of ATE departments are fully funded by governments. The sources of

outlay includes two parts: 1) fixed funds from the fiscal departments of the same-level government, almost no fluctuations in amounts year by year; 2) program funds from different levels of governments and the amounts related to the numbers of programs and financing strengths each year.

The financial source of basic-level extension departments is comparatively complicated. Generally speaking, there are three sources: 1) fixed finds from financial office of the same level government; 2) flexible program funds from the upper-level extension departments; 3) all kinds of creative incomes including dealing income and service fees.

The studies by State Council Development Research Center showed that less than 10% of extension funds were from central government and more than 90% were burdened by the local governments ((DRSCC, 2003).

1.2.4 The operating mechanisms of ATE

Various operating mechanism has been formed after the exploration for about 30 years since the reform and opening up policy in China. The major operating mechanisms include: research, teaching and extension-trinity operating mechanism; unity operating mechanism of science and technological R&D breakthrough; operating mechanism of agricultural high-tech demonstration gardens; enterprises, experimental base and households--trinity operating mechanism. The cooperation of extension organizations with the outside partners is strengthened and the extension organizations and agents are becoming more and more diversified through the establishment of these mechanisms.

1.2.5 The reform and innovation of basic-level ATE system in recent years

The reform of basic-level ATE organizations in recent years were executed from the following 3 aspects: 1) administrative system reform to reduce the redundant staff and set up multiple-town-covered extension stations or centers which are branch organizations of county-level extension departments. The previous town-based extension organizations can retain their names but get no funds from government. They became intermediary or development business organizations and some staff were discharged or split into other departments. 2) internal administrative system reform to encourage the competition among staff and the life-long employment is abolished. The forms may be different in distinct areas but the core of this policy is to extend the "all staff re-employed and positions applied competitively" systems to further stimulate the activeness of extension agents. 3) reform of operating systems of business entities to implement the new business model. The main task is to reform the extension-organization-run enterprises such as sale stations of agricultural production materials and to introduce the stock and corporate system (RCREMA, 2005).

1.2.6 Summary of the characteristics of ATE system of China

The ATE system of China has the following characteristics in the process of long-term development: 1) It is mainly led by government and managed by the agricultural administrative department. The various government-run agricultural extension organizations organize, coordinate and carry out major extension works. 2) Agricultural extension, education and scientific research belong to different government departments and they are relatively independent to each other. However, they have to cooperate with each other to conduct the agricultural enhancement activities such as agriculture cultivating, group contracting, key extension program undertaking and agricultural scientific breakthrough programs and make respective contributions to extension work. 3) Special extension organizations are composed of agriculture, husbandry, aquaculture, agro-mechanization and agro-business management as separate systems. 4) The major functions of extension organizations are technology extension, social service and education enlightenment, which ensure the implementation of national plan and the increase of farmers' economic returns through all kinds of extension means. 5) The county and town level extension organizations are regarded as the centrum and cadre of extension network respectively and performing a major role in rural extension. 6) The extension team was constituted by professional technological staff

and farmer technicians and the methods of expert-farmer integration and cooperation with clear division of labor prevailed.

At present, the mechanism and system of China ATE are facing transition and many problems need to be solved through further reform.

2. THE OPERATION PROBLEMS OF ATE SYSTEM IN CHINA

In the last 50 years, great achievement has been accomplished in ATE in China and many lessons have also been accumulated. However, ATE system still face a lot of problems, especially on the organization and management of basic-level agro-extension system such as personnel structure, investment, program management and extension methods, etc., which will immediately restrict the extension and transfer of agricultural technology.

2.1 The worrisome situation of ATE investment

2.1.1 The aggregate investment is far less than needed.

Currently, the major source of extension funding comes from general government expenditure on ATE, special extension program funds and other non-governmental extension funds mainly composed of generating income of town-level extension organizations. The analysis by GAO et al from China Agricultural University showed that the average of weighting percentage of agro-extension investment only account for 0.25 percent of the aggregate output of agriculture, forestry, husbandry and fishery in China (GAO, 2001). The survey conducted by United Nations Food and Agriculture Organization (FAO) in 113 countries from 1988 to 1989 revealed that the average percentage of ATE investment accounted for 0.96 % of agriculture aggregate output in 1980, 0.87% in 1985, 0.88% in 1988 respectively. The three years' average is 0.90%. So it is very obvious that the ratio of extension investment to total agricultural output in China is far lower than that of the world average.

2.1.2 The unreasonable structure of ATE investment

The government expenditure on ATE falls into two categories from micro perspective: personnel fees and fees on extension activities. According to the investigation by China Agricultural University research groups, the county-level average ratio of the two categories in 1999 was 8:2 and the town level was 9:1. More than 70% of the personnel fees are paid as salaries in most counties and towns. However, less than 10% of activity fees are directly used for extension work. Different areas are distinct a lot in salary payments. Generally, the salary ratio is much higher in less developed areas and the ratio of activity fee is lower as well. Recently, the ratio of personnel fees has been constantly above 70% and even over 80% in some years. The scarcity of activity fees not only limited the effective function of extension activities but also exerted negative impacts on extension work, which was shown in the following aspects: the low adoption rate of agricultural technology due to the lack of experiment demonstration fee; wasted resource due to reduced working time of extension agents on extension work; low work efficiency of extension agents due to the annoyance of low income.

2.2 Low-quality agro- tech extension team

The low quality of ATE team can be explained from the following three aspects: 1) unreasonable extension staff structure; 2) redundant non-professional technicians; 3) knowledge discontinuities and aging of present extension agents.

2.2.1 Unreasonable extension staff structure

The ratio of formal extension agents can not meet the demand of current agricultural production especially in the basic-level planting and husbandry industry extension organizations. Among them, the ratio of extension technicians from planting and aquaculture industry is lower than the output ratio of corresponding departments to aggregate agricultural outputs. Farmers are not only in urgent need of professional technicians but also the extension agents with managerial and marketing skills.

2.2.2 Redundant non-professional technicians

At present, only half of extension workers are professional. The problem of too many non-professional technicians has become one of the key factors hindering the development of ATE cause in China. A major part of non-professional technicians are engaged in the work of creative income and administration.

2.2.3 Knowledge discontinuities and aging of the present extension agents

At the grass- roots extension organizations, fewer college graduates joined the extension team due to the limited number of formal staff controlled by the government and there are little opportunities for old staff to renew their knowledge and skills, which leads to the phenomena of knowledge discontinuities and aging. Some of agricultural technicians can not extend the latest technology to farmers effectively due to the lack of training opportunities.

2.3 Imperfection of ATE system

2.3.1 The “top-down” extension function of government extension organizations deviated from farmers’ real needs for technology and information, which gives rise to the poor market direction of extension programs. For a long time, farmers are not involved in the formulation and implementation of extension plan. The main purpose of extension organizations is to fulfill the tasks assigned by governments. Whether the farmers need these technologies or not is not taken into consideration. Therefore, there are a lot of uncertainties existing in the extension activities. Whether the technology is promoted or not is not only determined by the financial status of government budget, but also by their personnel’s knowledge and individual behavior. If these officials haven’t realized the importance of agricultural technology, the corresponding extension programs can not get financial aid from the government,

2.3.2 Self-centered specialized extension organizations reduced the efficiency of ATE. The setting of basic-level extension system is based on the specialty. In most counties five specialized stations of planting industry (agro-tech station, plant protection station, horticulture station, soil and fertilizer station and economic crop station) are integrated into the ATE service centers. Some counties also set such specialized stations as vegetable station, orchard station, cocoon and mulberry station, tea-leaves station and forestry station, etc., all of which are under the leadership of agricultural administrative departments. Husbandry and veterinary stations belong to husbandry bureau, agricultural machinery station to agricultural machinery bureau and aquaculture station to aquaculture bureau, etc.. This multi-head administrative system is the main origin of the problems of low efficiency and resource waste in extension.

2.3.3 The simultaneous coexistence of “linear and block divisions” of extension works caused by county and town-level governments lead to the disintegration of extension works. Town-level governments were responsible for recruiting, financing and salary distributing of ATE after the tax

reform in rural areas. There was no effective cooperation between counties and towns. County-level extension departments gradually quit from the training and business arrangement. After the establishment of comprehensive extension organizations at town level, the extension works of extension stations became passive due to lack of independence, time and money.

2.3.4 Lack of effective cooperation among diversified extension organizations gave rise to unnecessary competition and waste of limited extension resources. Non-government extension organizations incrementally participated in the extension work, but their potentials were concealed due to backward corresponding system construction and management skills.

2.4 The mismatch between the extension models and the demand of market economy

2.4.1 The phenomena that extension work can not be done without the administrative pronouncement of government still exist, which lead to the mismatch between the extended technological achievements and customer needs. Therefore, it is quite often that the extended products can not be accepted by the customers (Gao, 1997).

2.4.2 The ‘top-down’ extension modes hinder the full performance of the benefits brought by the limited program funds. Currently, extension programs are dominated by governments. Although the competition mechanism is introduced during the course of project application, yet the projects themselves are not based on the needs of customers. Moreover, most extension programs go to those who had established relationships with some officials and they can not play the role of government investment thanks to lack of supervision and rigid inspection and evaluation on the program implementation.

2.4.3 The effective fund-sharing mechanism has not been established. Besides specialized government organizations, more and more private enterprises and NGOs also become the major ATE agencies. With the improvement of agricultural production and high level economic development, more and more customers also want to pay for the extension service provided by extension organizations in the production of economic crops and other profitable extension programs when the price is reasonably set. However, this mode only exists among voluntary extension organizations, individual extension agents and farmers so far. There is no effective fund-sharing mechanism between specialized government organizations and related customers.

2.5 The defects of ATE policies and institutions

2.5.1 There are no pinpoint authoritative policies stating the characteristics of the government extension organizations, i.e. whether is it full or half supported by governments. Although some documents dictate that they are government organizations, yet there is no distinct division as to their financial sponsorship. This leads to the casual practice in different counties and cities. Some counties categorize government full support extension organizations into part-support or self-support or categorize the competitive units into full-support organizations.

2.5.2 The non-rigorous staff management policy gives rise to the increment of non-profession staff in extension organizations. Since 1992, Ministry of Agriculture of China has practiced the policy of “three authorized” work, which refer to authorized character and function, authorized position and authorized staff employment in nation-wide town-level extension organizations. The initial aim of this

policy is to stabilize the extension team and change the situation of disconnection with the government and staff dispersion existing in extension organizations. However, some areas took the good use of this opportunity to expand the authorized staff and arranged many non-professional technicians into the extension organizations, which caused staff redundancy and inefficiency in these extension organizations (RCREMA, 2005).

2.5.3 The existing ATE Act can not follow the new trend of agricultural development. This law was enacted and implemented in 1993 and it played an important role in promoting and formalizing the ATE cause. However, some clauses become obsolete and can not function well in guiding and standardizing the agricultural extension work.

3. THE REFORM OF CURRENT ATE SERVICE SYSTEM

3.1 The idea and keystone of reform

The reform would be based upon the current situation of ATE development of China, with the focus on changing extension ideas, clearly defining the functions and coordinating the relationship between administration and extension affairs. China should learn from developed countries and make full use of such measures as system innovation, policy induction and capital support to activate all kinds of participative strengths, reasonably allocate all kinds of resources and establish the innovative government-service- leading ATE service system with the support of specialized economic and technical service departments. It should also be a multi-economic component, multi-channel and multi-level system based on cooperative economic organizations combining profitable and non-profit services, comprehensive and professional services with the aim of providing all kinds of technical support for the development of high-efficient, high-quality, high-productivity, ecological and safe agriculture.

The key points of the recent reform are to construct a diversified government-ATE organization-centered basic-level ATE service system with the participation of research and education institutes, farmers' economic cooperatives and agriculture related enterprises. It should be linearly connected with upper and lower level organizations with clear division of labor, full- function services, good orders and open structure. This system has the following advantages: it can not only manifest the function of strengthened regional service, enhance the pushing power of demonstration and enlarge the socialized service scope, but also adapt to the requirement of agricultural structure adjustment and development of agriculture-leading industry and regional specialized industry. Its functions for public interests include: the key and important technology introduction, experiment, demonstration, extension, animal and plant disease and pest monitoring, forecast, prevention and treatment, agricultural product quality and safety inspection, monitoring and compulsory vaccination, consultancy and training, monitoring the usage of agricultural resources, agricultural ecological environment and investment and public information service. It can also perform the functions of law enforcement consigned by the law department and administration task by administrative department. It should provide comprehensive service for farmers to solve the problems occurring pre-production, production and post-production through the development of business service, organizing share-holding corporations and special cooperatives (GAO et al, 2005).

3.2 The fundamental reform measures

The fundamental measures of the reform should : clearly define the function , better the system , innovate the mechanism , guarantee the public investment and perfect the related regulations.

3.2.1 Clearly define the functions

At present, the major functions of state ATE organizations are: public interest service, intermediary service, business service and law enforcement and administration. The four functions need to be redefined in the reform: the extension organizations would not perform some functions of law enforcement and administration which belong to government function and is not thought of as professional extension works. Those high professional works can maintain their position in county-level extension organizations. The main function of government extension organizations is to undertake the public goods service which includes: introduction of new breeds and technology, experiment, demonstration, extension, animal and plant disease and pest monitoring, forecast, prevention and treatment, agricultural product quality and safety inspection, monitoring and compulsory vaccination, consultancy and training, monitoring the usage of agricultural resources, agricultural ecological environment and investment, public information service and farmers' training, etc. Some business functions such as supply of agricultural materials, diagnosis of animal diseases and post-production processing and transportation and sales should be separated from government extension organizations. They should be operated with the mode of marketization. The generalized extension service such as breeding and technological consultancy should be conducted through the experimental stations to investigate the best modes of operation. One part of the intermediary service should be undertaken by government extension organizations, for example, product inspection and identification. Another part can be undertaken by other entities or individuals. Socialized service may also be feasible in many related areas.

Extension organizations performing the public service functions should formulate effective policy to ensure that all the employed staff is qualified for their positions and the staff with professional skills should account for 80% of the authorized staff. The funds for public goods extension should be appropriated by government. The staff providing generalized technological skills and business services should be encouraged by favorable policies. The technicians can compete for positions in public service extension organizations or undertake the government extension programs through bidding after being trained and instructed.

3.2.2 Better the system

First, appropriately set the organizations. The ATE service organizations should be set appropriately according to the requirement of local leading and specialized industry with the principle of simplicity, unity and efficiency. They should also be in conformity with local financial situations. In the long run, state extension institutions should lower their administrative hierarchy, from five levels to three levels (central, regional and basic-level) and their respective functions should also be clearly defined. The construction of county-level extension organizations should be enhanced, which can become the pivot and bridge of the central and basic level extension organizations. Specifically, mergers among related specialized organizations should be encouraged to form comprehensive extension stations.

Second, put emphasis on vertical administration. To actively investigate the management modes of state extension organizations is of vital importance in undertaking the forecast and report of crop disease and pest and animal disease, organizing special teams and organizations and meeting the real needs of different specialized extension organizations. The practical method is to apply vertical administration system, which means the lower-level extension organizations should accept the leadership of upper level extension organizations.

3.2.3 Innovate the mechanism

First, establish the completed internal administrative system. The personnel system should be reformed. The 'iron bowl' should be broken. The number of staffs should be decided by the positions. The staffs

who apply positions in public interest extension organization should have certificate showing their qualifications. The evaluation system should be based on the achievements and efficiency of the extension agents. It should be client-oriented. The effective training system should be established for ATE workers. A series of policies such as financial support, institutional guarantee and time evaluation should be formulated to renew the extension workers knowledge and technology. The rewarding as well as penalty systems are also necessary to commend those who have made contributions and to distribute non-professional workers.

Second, innovate the extension methods. The varieties of farmers' needs necessitate the innovation of extension modes and methods, for example, providing consultancy and training in large area, demonstration and instructions at the spot. To cover large area, i.e. the extension methods such as "agro-tech 110" telecenters, 'electronic transfer', 'science and technology fair', saleroom consultancy business, training classes and pamphlets are adopted to spread knowledge and techniques to farmers and accept consultancy from farmers; at the spot, different demonstrations and instructions based on agro-tech demonstration farm, large-scale specialized households and demonstration plots are applied to attract farmers coming to the spot to learn and ask questions. Therefore, it is necessary to increase financial input to promote the construction of town-level agro-tech demonstration farms.

Third, set up multi-lateral cooperative mechanism. The cooperative extension mechanism should be established among the government extension organizations, research centers, education organizations, agriculture-related enterprises and farmer's special cooperatives. In the areas with many colleges and agricultural research institutes, the extension works can be based on these colleges and institutes. The key to achieving this is to formulate effective measures to encourage non-government organizations to participate in extension works, which can be achieved by enlarging the service scope of non government organizations and decentralizing functions to non-government organizations to form the orderly competition between government ATE organizations and non-governmental ones. Meanwhile, appropriate financial support is necessary for non-government organizations to conduct extension works.

3.2.4 Guarantee public investment

The public goods character of ATE determines that the public investment should be the main source of agricultural extension expenditure in China. With the rapid development of national economy and increase of revenue, it is also feasible in the near future to appropriately increase the investment on agricultural extension. Based on the arrangement of positions and allocation of staff of public welfare extension organizations at different levels, the amount and structure of public extension investment should be determined. It is necessary to increase the proportion of extension investment from the central government and define the areas of investment from central and local governments. The central financial input is mainly used for major technological extension projects, the innovation of key extension models (such as the construction of agricultural science and technology demonstration gardens and "agricultural technology 110" telecenters, etc.), and the equipment procurement in the agricultural extension agencies, key training projects and information network improvement, as well as the staff's subsidies in ATE in poverty-stricken areas. Local financial investment is mainly used for personnel expenses, operating expenses, training costs and the central matching costs. It is also imperative to determine the proportion of all types of funds. The operation expenses should be divided into personnel expenses, training expenses and pilot demonstration, etc. proportionally in the budgets at all levels. The central and local financial ratio could be 3:7, and related auditing and monitoring should be strengthened to prevent from funds being misappropriated.

3.2.5 Perfect the related regulations

The fundamental guarantee for developing the extension cause is to do extension work by law. ATE Act of China was promulgated and implemented in 1993 which played an important role in the development of China's agriculture and the cause of agricultural extension. However, with further development of the

market economy, the current ATE Act is not compatible with the implementation measures of the ATE regulations enacted by people's congresses at provincial, autonomous regional and municipal levels. Therefore, it is of vital importance to modify the " ATE Act of People's Republic of China " as soon as possible, and to introduce the matching measures to make it adapt to the requirements of WTO accession and gradually meet the international standards and the track of the legal system to guarantee the sound development of the agricultural extension cause. During the course of amendment of laws and regulations, it is necessary to consolidate the achievements of reform and innovation and to be clear about the subject of law enforcement and the functions and tasks of extension organization, protective measures, penalty clauses, etc. Meanwhile, efforts should be put on the formulation, revision of agricultural extension-related regulations and policies to figure out a series of supportive systems of agricultural extension regulations and policies which can adapt to the current situation of China.

4. SUMMARY AND CONCLUSIONS

In current China, the major task of agricultural extension is still focused on transfer of agricultural technology since the adoption rate of new technology and the contribution rate of scientific research are comparatively lower than those of most developed countries. The ATE system of China has the following characteristics in the process of long-term development: It is mainly led by government and managed by the agricultural administrative department; Agricultural extension, education and scientific research belong to different government departments and they are relatively independent to each other; It is composed of five special extension organizations (agriculture, husbandry, aquaculture, agro-mechanization and agro-business management) which are run separately; The major functions of extension organizations are technology extension, social service and education, which ensure the implementation of national plan and the increase of farmers' economic returns through all kinds of extension means; The county and town level extension organizations are regarded as the centrum and cadre of extension network respectively and performing a major role in rural extension; The extension team was constituted by professional technological staff and farmer technicians and the methods of expert-farmer integration and cooperation with clear division of labor prevailed.

The long-formed "top-down" extension system had been quite successful in increasing the adoption rate of new technology due to the financial support of governments. However, with the development of China's rural economy, the drawbacks of the existing system are also becoming more and more obvious which restrained the further development of both China's agriculture and agricultural technology. These problems are diagnosed from the following aspects: 1) the situation of ATE investment is worrisome because of its deficiency and unreasonable structure; 2) low-quality agro- tech extension team which caused by the unreasonable staff structure, redundant non-professional technicians and knowledge discontinuities and aging of the staff; 3) the divergence between the farmers' real needs for technology and the achievements of scientific research caused by the "top-down" extension function, inefficiency and lack of cooperation among extension organizations; 4) the mismatch between the extension models and the demand of market economy; 5) the defects of ATE policies and institutions.

Some reform directions and measures are proposed in order to solve these problems. The purpose of the reform is to establish a multi-economic component, multi-channel and multi-level extension system based on cooperative economic organizations combining profitable and non-profit services, comprehensive and professional services with the aim of providing all kinds of technical support for the development of high-efficient, high-quality, high-productivity, ecological and safe agriculture. To accomplish this, The fundamental measures of the reform should : clearly define the function , better the system , innovate the mechanism , guarantee the public investment and perfect the related regulations.

To sum up, China's ATE system had experienced a great change and also played a significant role in agricultural economy and rural development of China. However, it is also facing a lot of challenged in the transition period of Chin. There is still a long way to go for China's ATE system reform to meet the real needs of integrated rural development of China.

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