Trends and Developments within the Chinese Agro-Technical Extension System
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Abstract

This paper describes important developments undertaken to improve the performance of the Chinese extension system. During the early 1980s, 29 counties pilot tested a new organizational model whereby seven different county level stations were integrated into a County Agro-Technical Extension Center (CATEC). This new model greatly improved extension performance and is now being used in 80% of the counties. In addition, this integrated system strengthened linkages between CATECs and Township Agro-Technical Extension Stations (TATES), which organize front-line extension activities. TATES work through village-level farmer technicians and demonstration farm households in organizing demonstrations and farmer training. During the 1990s, specialized farm households and farmer associations (higher value products) have become an important target group for extension.

Passage of “Extension Law” in 1993 fully decentralized the extension system, so most funding comes from the corresponding level of government. County and township governments provide partial funding for extension programs and operations, but CATECs and TATES are expected to generate an increasing share of funding for extension programs. Many different funding approaches have been field-tested, however, the “Prescription and Filling the Prescription” model has gained broad acceptance. This approach is similar to how private firms and cooperatives in North America and Europe fund technical advisory services. The cost of these “privatized” advisory services is recovered directly from farmers when they purchase inputs directly from the “commercial” side of the extension center. Farmers prefer this new approach and the number of technical advisory personnel funded by these “commercialized agricultural services” has been greatly expanded.

Introduction

The Chinese agricultural extension can be traced back to the imperial dynasties of 3-4000 years ago. Extension activities in ancient times were primarily the exchange and diffusion of experience-based skills, knowledge and technology. The development of the modern extension system, which is linked with agricultural research and education, began at the turn of the Twentieth century. However, since the founding of Peoples Republic of China (P. R. C.) in 1949, many new, government-based institutions have emerged to strengthen agricultural extension services. In particular, agricultural production in China has increased rapidly since the economic reforms of 1979, quadrupling 1949 production levels. The Agro-Technical Extension Center (ATEC) system, which was established in the early 1980s because of these reforms, has played a key role in helping China to become self-sufficient in food production (Delman, 1991).

Purpose

The purpose of this paper will be to describe and analyze important developments and reforms that have been implemented during the past 25 years to improve the performance of the ATEC System. These developments also reflect several concomitant factors, including the progressive move to a market-based economy, broader government reforms, and the reduction in public funding for extension.

Trends and Developments in the ATEC System

The current ATEC system consists of five administrative levels (see Figure 1), plus farmer technicians who operate at the village level. At the end of 2001, the ATEC system was
Figure 1: Structure of Agro-Technical Extension System

Ministry of Agriculture
  ↓
Provincial Department of Agriculture
  ↓
Provincial Agro-Tech. Extension Center
  ↓
Provincial Plant Protection Station
  ↓
Provincial Soil Fertilizer Station
  ↓
Municipal Agro-Tech. Extension Center
  ↓
Municipal Plant Protection Station
  ↓
Municipal Soil Fertilizer Station
  ↓
County Department of Agriculture
  ↓
Township Dept. of Agriculture
  ↓
County Agro-Technical Extension Center
  ↓
Township Agro-Technical Extension Station
  ↓
Farmer Technicians
  ↓
Demonstration Farm Households
  ↓
Farmer Associations
composed of approximately 371,350 staff (Ministry of Agriculture, 2001), 500,000 farmer technicians (FT) who primarily operate at the village level, and 6.6 million demonstration farm households (DFHs).

Establishing CATECs to Promote System Development

Prior to 1979, there were many separate agricultural development agencies serving farmers at the county and township levels, including the Extension Station, Agro-Research Institute, Crop Cultivation Station, Plant Protection Station, Seed Station, Soil and Fertilizer Station, and the Agro-Technical School. These individual agencies were weak, duplicated efforts and were generally inefficient. To develop a strong, grassroots extension system, these different stations were integrated into a new County Agro-Technical Extension Center (CATEC). This new integrated approach created many efficiencies and allowed more resources to be focused on extension priorities within each county. This approach was pilot tested in 29 counties during the early 1980s and subsequently expanded throughout the country during the 1990s. Now, over 80% of the counties in China have adopted the CATEC model.

The mission of these new CATECs was to 1) design or formulate extension programs based on local needs; 2) introduce new technologies (e.g., new varieties, fertilizer, agro-chemicals) from research; 3) train and support Township Agro-Technical Extension Station (TATES) staff, township government officials, and village-level farmer technicians, 4) prepare extension materials for use at the township and village levels; and 5) conduct crop scouting surveys for insect and disease occurrence and, when needed, to disseminate pest control recommendations to farmers.

At the same time, the TATES were being reorganized and strengthened. TATES are responsible for front-line extension activities by organizing, coordinating and supporting the work of village-level farmer technicians, and by working through the demonstration and specialized farm households (SFHs) in each village. During the past two decades, TATES have become more closely linked with their respective CATEC, especially due to the efforts of the county extension staff who provide training and technical support for the TATES staff.

CATEC and TATES are the main grassroots extension units in China. Recently, in some areas of China where agronomic conditions are similar and the working efficiency of extension is higher, CATECs are establishing multi-township Regional Agro-Tech Extension Stations (RATES). Extension personnel for these RATES are primarily coming from existing TATES, with a few staff members being transferred from the local CATEC. In these cases, the county government is financing these new RATES. Also, in some poorer areas, where the township government has difficulty providing adequate finance to support a TATES, these multi-township RATES are being established by the county government.

Decentralizing the ATEC System in Response to the Market Economy

As the CATECs and TATES became established, they began taking on increasing responsibility for crop related science, technology, and education activities within each county. First, the county government, through the Department of Agriculture, took increasing responsibility for funding county extension activities (Maalouf, Adhikarya, & Contado, 1991). By 1993, when the “Law of the People’s Republic of China on the Agricultural Techniques Extension” was passed, each level of government (national to the township levels) became fully responsible for providing both capital (facilities and equipment) and operating funds for their own respective extension activities (Nie, Swanson, & Feng, 2002; Swanson & Samy, 2002). In addition, other county-level government offices began collaborating with CATECs to allocate funds for development projects and/or to provide training for farmers. For example, CATECs began submitting proposals to the County Department of Science and Technology (Nie, Swanson, & Feng, 2002). If these projects focus on promising technologies, address real needs and have the political support of farmers within the county, then they are likely to be funded. CATECs also cooperate with other government offices, such as the County Women’s Federation (CWF) in providing training for women farmers. By collaborating with these different government offices, the CATEC is able to gain access to new
sources of operating funds and to build strategic alliances within the county for the benefit of rural farm households.

**Targeting Extension Programs to Reflect Clientele Differences**

At the village level, there are large numbers of very small farmers that need to be reached with extension programs. During the 1980s, as the ATEC system was being established, CATECs and TATES focused their efforts on demonstration farm households (DFHs) as the key focal point in each village to demonstrate new food crop production technologies. In demonstrating new technologies, these DFHs are supported and monitored by village-level farmer technicians (FTs). These FTs are not regular extension staff, but they are farmers with technical agricultural education (see section on CABTS below) and who work about 50% time on extension activities for a modest stipend (Nie & Wu, 1993).

During the 1990s, as the agricultural sector began to diversify, younger, better-educated farmers began to specialize in higher value farm products, such as fruits, vegetables and specialized livestock. This new generation of farmers is designated as specialized farm households (SFHs) and they are more aggressive in seeking out the most promising technologies and new markets for their products.

In an effort to solve input supply, technical, and/or marketing problems, these SFHs began organizing “commodity specific” Farmer Associations (FAs). In townships or counties near larger cities, there may be 10 or more different FAs, with each group focusing on a different high value commodity. There are an estimated 100,000 FAs that have been organized across China (FECC, 2001) and these producer groups will become increasingly important now that China has joined the World Trade Organization (WTO) and will be competing for high value overseas markets.

**Extension Methods**

**Demonstrations**

To deal with the problem of large numbers of small farmers and to increase the working efficiency of extension, a combination of extension methods has been used to extend technologies. First, both “method” and “result” demonstrations are widely used by extension.

CATECs and TATES utilize both DFHs and “demonstration villages” to popularize new crop production technologies. During the growing season, field days are organized for other farmers to see the result demonstrations and learn new techniques. In a survey carried out in Wuqing County, it was estimated that TATES staff spent 45% of their time on demonstration activities (Nie, Swanson, & Feng, 2002).

**Training**

Group training is commonly used by the CATECs in staff development (i.e., TATES level extension staff and FTs) and it is an efficient way for the TATES to train both “demonstration farmers” and other farmers within each township. Both CATECs and TATES have training facilities and equipment, and most training events are based on a needs assessment that is carried out by the extension staff. Subject matter specialists (SMSs) from CATECs, scientists from provincial or prefecture research units, and faculty from a nearby agricultural college or university are all used to provide different types of training within each county. In addition, township or county-level FAs utilize these same facilities to hold business meetings and/or to conduct their own training activities.

**Mass Media**

The mass media is widely used in China to disseminate new agricultural technology, alert farmers of potential pest problems and for farmer training. CATECs produce printed materials that are disseminated through TATES and farmer training events. In addition, most farm households have TV sets; therefore, TV is commonly used during extension campaigns to create awareness of new technologies or to warn of pest problems. Many Provincial Agro-Technical Extension Centers (PATECs) have broadcast quality television equipment that is used to both produce TV programs for extension campaigns and training videos for use at the county and/or township level.

**Distance Education**

The Central Agricultural Broadcasting and Television School (CABTS) also makes extensive use of educational TV to provide training courses for field level extension staff, including FTs. CATEC staff members frequently serve as tutors for these courses that
are offered via distance education. Finally, individual CATECs are now using the Internet for a variety of purposes, including: reporting on new research findings and technology, identifying new markets for farmers within their county, and helping farmers to advertise and sell high value products in cities.

**Alternative Approaches to Financing Extension**

As a part of government reforms that were implemented in the 1990s, the ATEC system has been required to develop new revenue generating mechanisms and to shift more extension costs to farmers. Different mechanisms are being field-tested and described, including _contract extension_, _private extension_ and _commercialized agricultural services._

**Contract or Fee-Based Extension**

Farmers’ demand for new technologies has increased tremendously over the past two decades with the commercialization and specialization of agricultural production. In responding to this new situation, some extension units have begun offering _technical contract extension services_ at the village or farm level. One approach has the TATES director sign a technical contract with the village head. The contract calls for the TATES staff to provide specific types of technical services for farmers in the village, such as information on new production technologies, disease and pest forecasting and protection, marketing information, and better access to high quality production inputs. These contract extension services are provided directly to individual farmers in the village or through a village committee. In return, each farmer is expected to pay the TATES for these services at the end of season. In this case, extension becomes essentially a _fee-based_ service (Nie, Swanson, & Feng, 2002).

In some provinces, individual extension staff members have signed technical contracts to provide _fee-for-service_ advisory services to specialized crop farmers. Again, the underlying assumption is that if the farmer receives valuable advice that increases their productivity and income, then they should be willing to pay for this service. In some provinces, individual farmers have signed _consultancy agreements_, secured good yields and received higher incomes. However, at the end of the season, they have been unwilling to pay the consultancy fee; they still think that extension should be a free service. This procedure raises several important policy and personnel issues about the advisability of individual extension staff members providing _fee-based consultancy services_ to individual farmers while they still government employees (Nie, Swanson, & Feng, 2002).

**Private and Privately Funded Extension**

In recent years, private agribusiness firms have begun signing production contracts with individual farmers. Under these contracts, most companies specify the production technology to be used. In addition, they may provide the specific variety of seed, planting material or young animals to be used and/or other types of technical inputs that will help ensure product quality. These private companies may also provide direct training to farmers or they may sub-contract needed extension and training activities to the local CATEC or TATES. At the end of season, the company collects each farmer’s production at a fixed price and pays for all input supply, training and advisory services from proceeds.

Under this approach, both the company and farmers benefit. Contract production is commonly found in areas where high value vegetables, fruit, and/or dairy milk is produced. This approach is also being used by firms that contract for high quality rice, wheat and corn for export, or other high value end-use markets. Where the company provides inputs and training, the approach is called the _Company + Farmers_ model. In cases where the local extension service is involved, it is called the _Company + Extension + Farmers_ model (Nie, Swanson, & Feng, 2002).

There are several advantages to _contract production_ and _private extension_. First, companies benefit since they have direct contact with farmers and are able to ensure a stable supply of high quality products. Second, where extension units contract directly with the private firm to provide technical training and supervision, they have a new revenue source to support extension activities within the township. Third, farmers are satisfied with this arrangement since they have access to the best available technology and a guaranteed market for their products. Fourth, the government
encourages this type of public-private collaboration, since large numbers of farmers in one or more townships can be organized as a group or farmer association to capture economies of scale in producing specific high value products. This allows private firms, in combination with local farmers, to be more competitive in pursuing both domestic and foreign markets.

**Selling Input Supplies or “Prescription and Filling the Prescription.”**

Many TATES have established commercial input supply shops to provide an integrated source of diagnostic and advisory services in combination with recommended seeds, fertilizers, pesticides and other agricultural inputs. These ATEC service and input supply centers are quite similar in function to a private or cooperative input supply centers in North America or Europe. Farmers get one-on-one consultations and advice from a trained technician and then the cost of this “advisory service” is financed from the sale of production inputs.

To separate commercialized agricultural services (CAS) from on-going extension programs, the approach developed under a recent World Bank financed Agricultural Support Services Project (ASSP) was to bifurcate each TATES into two administratively separate units: extension and CAS. The publicly funded extension staff works on farmer training and demonstration programs, while the commercially funded staff provides one-on-one advisory services to individual farmers. The TATES director has overall responsibility for both functions. Under the ASSP, each TATES was assisted in establishing a diagnostic service.

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1. In an effort to increase new sources of financing for extension, some CATECs have also established input supply and service centers for farmers in surrounding communities.

2. The ASSP only provided diagnostic equipment for the service center. Each township government was responsible for constructing the TATES building, except for the classroom (70M² on the second floor of the TATES) that was financed by the project. Other ASSP financed investments for each TATES included audio-visual equipment and teaching center in conjunction with an input supply store. The diagnostic service center was designed to provide one-on-one technical advice to farmers who, in turn, could purchase seed, fertilizers, pesticides, and other agricultural inputs from the TATES’s store. It should be noted that farmers are not required to purchase inputs after a consultation, however, inputs being supplied by the TATES are competitively priced and farmers like this new service.

The profits from these CAS are used to expand both extension and advisory services. First, these profits fully finance the salaries of those TATES personnel who provide “individualized” technical, management, and diagnostic services to farmers, and who sell agricultural inputs. For example, in a typical township, two extension staff members (the TATES director and his/her assistant) are generally paid directly by the local township government. In addition, project supported TATES have hired, on average, 5-6 additional staff members whose salaries are directly financed from CAS earnings. To ensure that farmers receive sound technical advice, all TATES staff are technically trained and work under the overall supervision of the TATES director. In addition, they receive in-service training and technical backstopping from CATEC subject matter specialists (SMSs).

In addition to substantially expanding “individualized” advisory and diagnostic services to farmers, some of the CAS profits are used to finance the operational costs of on-farm demonstration and farmer training programs. To

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3. Based on monitoring and evaluation indicators compiled by the Ministry of Agriculture, at the end of ASSP (2001), an additional 4019 technicians had been employed to carry out individual advisory and CAS activities in the 705 TATES that were strengthened under the project, or an average increase of 5.7 technicians/TATES.

4. The minimum level of training of all TATES personnel would be a technical high school diploma, with most receiving their training from the Central Agricultural Broadcasting and Television School (CABTS); some TATES staff, especially the TATES’s director, would have a three year, post-secondary agricultural diploma.
provide some indication of the importance of these CAS earnings in financing "extension" activities, between the mid-1990s and 2001, the 705 ASSP supported TATES reported an aggregated gross income of over 7 billion Yuan⁵ (¥) or about $851 million. These 705 TATES reported aggregated net earnings of about ¥524 million ($63 million), with about 181 million ($22 million) being reinvested in extension programs, the remainder is being used to cover the salary and operational costs of CAS activities (FECC, 2001). This basic model is now being widely adopted by TATESs and CATECs throughout much of the country.

**Establishing Commercial Enterprises**

In response to government reforms and the need to generate new revenue streams, many extension units established their own agriculturally related enterprises. These enterprises range from value-added corn processing and rice milling factories to fertilizer blending plants. For example, under ASSP, the project provided *in-kind* working capital to any CATEC that wanted to establish a fertilizer blending plant that would produce compound fertilizer in line with the nutritional requirements of major crops, and based on soil test and adaptive research trial results. The rationale for promoting this type of CAS was the lack of compound fertilizer in most provinces. To participate in this program, the CATEC was required to take out a capital loan and construct a factory that would meet minimum Chinese Chemical Industry Bureau standards. Some of these commercial enterprises are financially successful, but these ventures tend to detract extension from its central mission.

**Trial and Demonstration Farms as Commercial Enterprises**

Because of expanding economic activities, an increasing number of farmers have migrated to towns and cities in pursuit of higher paying off-farm employment. Many of these farmers give up their *land use rights*⁶ to avoid paying the land tax, since it is very difficult to generate a profit on very small farms (e.g., <0.25 hectare). In villages where there has been an exodus of farmers, some TATES have organized *Trial and Demonstration Farms*. Under this approach, TATES rents a block of available land from the village and then it operates the T&D Farm as a commercial enterprise. For example, they may decide to demonstrate a new high yielding variety as a demonstration. In the process, they are also able to multiply the seed for sale the following season as certified seed. In other cases, they may produce nursery stock for direct sale to other farmers (Nie, Swanson, & Feng, 2002).

**Conclusions**

As China began the transition to a market economy, the government initiated a number of extension reforms to give farmers greater access to new skills and improved technology. The most important structural change, to improve the performance of the extension system, was to create a CATEC in each county that integrated all agricultural research, extension, and education programs and personnel into a single center. Another important reform was to shift financial responsibility for extension programs to county and township governments. Under this decentralized extension system, county departments of agriculture played a larger role in setting extension priorities. The decentralization of the ATEC system was fully completed a decade later when the Chinese government passed the Extension Law in 1993. Under this law, each level of government became fully responsible for funding its own extension system.

In 1993, the central government undertook other reforms designed to downsize rapidly the entire public sector. Consequently, the ATEC system has experimented with having long-term *use rights* that can be passed on from generation to generation. To maintain these use rights, farmers must continue to produce agricultural products, pay land taxes and sell a specified amount of grain (rice, wheat or some other staple food crop) to the government to ensure food security. If farmers take up off-farm employment and “abandon” their farmland, they forgo their use rights and the land reverts to the township or village government for redistribution.

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⁵ The reporting period differed across project units, but this figure represents the total gross income for about 5 years. The amount of *annual* gross and net income being generated at the close of the project was not determined.

⁶ Chinese farmers do not have *fee simple* ownership over their farmland, but they do
different approaches to financing extension. The goal was to maintain the effectiveness of the extension system as government investments in agricultural research and extension were reduced. The Prescription and Filling the Prescription approach actually expanded “one-on-one” advisory services to farmers on a full cost recovery basis. This approach, which has already been widely adopted across China, has partially privatized the ATEC system in China by bundling production inputs (private goods) with technical information (public goods). Several other financing approaches have been tried, but these models look less promising and need further evaluation to determine the long-term advantages and disadvantages.

The other significant development that has occurred in Chinese agriculture during the 1990s has been the shift toward diversification into high value agriculture. In the process, many farmers have specialized into high value crops, livestock or other enterprises. These specialized farm households have organized into different types of farmer associations, especially to market their products in urban areas. Because of these changes, the extension system in China has become increasingly farmer center and market driven. These reforms and developments offer important lessons that other countries may wish to consider in improving their respective extension system.

References


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