

# The Problems in and Countermeasures for Cultivating High-Level Agricultural Personnel

## —With Reference to the Development of Agricultural Education of Japan

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### Abstract

The cultivation of high-level agricultural personnels is a key issue to solve the problems concerning “agriculture, rural regions and rural labors” and to guarantee the development of agricultural economy. The paper, with reference to the agricultural education of Japan, analyses the top six problems facing the cultivation of agricultural personnels at present stage in China, and puts forward nine countermeasures to deal with them.

### Keywords

High-Level, Agricultural Personnel Cultivation, Agricultural Education in Japan

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## 1. Introduction

On November 13, 2018, at the “*Conference on Undergraduate Education of Yunnan Province for the New Era*”, Wu Yan, general director of the Department of Higher Education of the Ministry of Education, proposed to accelerate the construction and development of new majors on engineering, medicine, agriculture and liberal arts. On December 5, 2019 in Beijing, at a conference on guiding the new agricultural construction work, the director stressed “under the background of the new era, reform and innovation have to be made to the modes of personnel cultivation in colleges and universities”, to “improve their ability in serving the national strategy for the development of economy and society. That is: To make great improvement in all possible fields by way of creating new agriculture. We should “accelerate the cultivation of new agricultural and forestry personnels who know and love agriculture”. High-level agricultural person-

nels are in great need to work out the problems concerning “agriculture, rural regions and rural labors” and to create new agricultural science.

Although there have been qualitative changes in agricultural education in China and new agricultural achievements have often been accomplished, still, there are big standing problems in the cultivation of agricultural personnels. High-level agricultural personnels, for instance, are in great need. According to education statistics, the number of the enrollment of graduate students in agricultural majors was significantly smaller than that of other disciplines in 2017 (Zhang et al., 2020). Just as the minister of agriculture Du Qing-lin notes: “This could be the most powerful restrictive factor in future development of sustainable and healthy agricultural and rural economy, in achieving the national target of economy quadruple, and in building a well-off society in an all-round way.” (Ding, 2004).

Japan, by comparison, has a higher agricultural education that has always been in progress, although the proportion of the agricultural output value in Japan’s GDP has been decreasing year by year. Since the commencing of modern times, Japan, in only 100 years, has not only embarked on the road of agricultural modernization, but also forged its modern agricultural education with its own special features. The reason lies in the fact that agriculture is highly valued in Japan. In recent years, it takes the development of agricultural education as a fundamental measure to revitalize its agriculture and recover the decline of agricultural economic status.

Although China and Japan differ from each other in national conditions, history, agricultural foundation, present status of agricultural economic development, and different development tracks of agricultural education, we could draw lessons from some common experience of Japan in developing agricultural education in terms of cultivating high-level agricultural personnels. By studying a number of effective methods for developing agricultural education of Japan and putting forward some respective countermeasures for cultivating high-level agricultural personnels, both the scientific nature and feasibility of the research results can be guaranteed to be put into use at certain degree.

The article is divided into five parts: The first part introduces the background and reasons of this research; In the second, third and fourth parts, the paper expounds the urgency and necessity of the cultivation of high-level agricultural personnels for the development of agricultural economy in China, the top six problems facing the cultivation of high-level agricultural personnels in China at present stage, and the nine countermeasures for the cultivation of high-level agricultural personnels. And in the last part, the practical and social significance of this study is presented.

## **2. The Urgent Necessity and Importance of Cultivating High-Level Agricultural Personnels in China**

Agriculture is the most primary industry. It is at the basic position in the development of national economy and society (Li, 2012). Even in developed coun-

tries, great importance is attached to the development of agricultural economy. For instance, Japan has always attached great importance to the development of agricultural economy, which makes the degree of agricultural modernization in Japan, the development of high-tech agricultural products and the development of agricultural tourism have great influence on the whole world. All can't have been done without high-level qualified agricultural personnels. Consequently, laying emphasis on the cultivation of agricultural personnels has been a significant strategy to develop agricultural economy.

With the progress of science and technology in all fields and the arrival of the Internet Era, high-level agricultural personnels have increasingly manifested their importance in developing national economy. The lack of high-quality agricultural personnels with high professional level, strong management ability and broad vision and perspectives has become a restrictive power in developing agricultural economy.

Although, our state has taken all possible measures to follow the high-level personnels oriented way to upgrade and boom agriculture, the number of agricultural personnels, compared with the large agricultural population in rural regions, is surprisingly small. To make the matter worse, all these personnels are unevenly distributed, and mainly found in developed regions or the suburbs of big prosperous cities. It is even worse to face the fact that these agricultural personnels are relatively weak in their overall make-up of professional knowledge and skills. All these factors have combined to leave our nation in great need of high-level agricultural personnels, which makes it impossible to satisfy the need of developing our nation into a wealthy one with sound agricultural status. So, in terms of agricultural personnels, China has a long way to go to upgrade and boom its agriculture. It is not only necessary, but also urgent to cultivate high-level agricultural personnels to solve the severe problems relating to "agriculture, rural regions, and rural labors" to build up new agricultural majors, to develop agricultural economy, and to uplift national power as a whole.

### **3. The Severe Problems Existing in the Process of Cultivating Agricultural Personnels in China**

The lack of high-level agricultural personnels is closely related not only to the education level of colleges and universities, but also to the way in which agricultural personnels are cultivated. A comprehensive review of the cultivation of agricultural personnels in China in recent years reveals a few severe problems as follows:

Firstly, what kind of people to be cultivated has been unclear. For a long time, the agricultural education of China has mainly focused on cultivating cadre personnels (Li, 2004). Many majors, especially the agriculture and forestry majors of comprehensive universities, lack scientific top-level design on what kind of people to cultivate and how to cultivate them. There has been no scientific analysis of the professional knowledge, suitable technical fields or qualified vocational positions for students to be cultivated, which has made it impossible to sa-

tisfy the economic and social needs and match the features of agricultural colleges and universities. As a result, the cultivated personnels often fail to meet the requirements for their actual ability.

Secondly, the make-up of curriculum has not been reasonable enough, and all courses cannot be effectively integrated and supplemented, and cannot well meet the requirements of modern agricultural demanding for high-level agricultural management personnels with high and strong ability.

Thirdly, there have been defects in the designing of the curriculum. The practical teaching system has been particularly incomplete. Even if the practical teaching platform were built, there would be also a lack of effective field work practice, which made it difficult to fulfill the task of cultivating high-level agricultural technical personnels.

Fourthly, the cooperations between production, education and research and the cooperations between schools and enterprises still remain at the beginning level or lack institutional guarantee, and as a result, the cooperation in cultivating agricultural personnels cannot run deep.

Fifthly, there has been a lack of deep understanding and sound enthusiasm for agricultural work among agricultural majors, which results in low employment rate of agricultural personnels. "As one begins to study agriculture, he makes up his mind to leave it." Agricultural personnels stuff has been not stable, and the brain-drain phenomenon has been serious.

Sixthly, the supporting policy of local governments and capital investment in agricultural education are not adequate, rendering it unattractive and development of agricultural education impotent.

#### **4. The Countermeasures for Cultivating High-Level Agricultural Personnels in China**

According to the above-mentioned problems, and referring to the experience and lessons of the developed countries, Japan in particular, the author argues that the cultivation of high-level agricultural personnels in China can be promoted through the following measures:

##### **4.1. Be Clear about the Cultivated Target, Make Innovation to Cultivating Style and Scientifically Set up the Goal of Personnels Cultivation with the Orientation of Vocational Demands**

At different stages, economic and industrial development has different demands for personnels. From the 1950s to the 1970s, with the rapid growth of Japan's economy, the goal of agricultural education in Japan turned to be higher and higher. And colleges and universities of different levels had different positioning for their target in cultivating personnels: colleges and universities were responsible for teaching extensive knowledge and engaging in specialized research; In short-term cultivating programs offered by some colleges and universities, the teaching and research were intensive and specialized, and more attention was

paid to the cultivation of skills necessary for careers and practical work. Agricultural colleges and universities aimed to educate the youth of farmers who graduated from high schools to become the backbone of modern agriculture. From the 1970s to the 1990s, agricultural education in Japan changed from quantitative expansion to qualitative pursuit. Since the 1990s, Japan has continuously adjusted the teaching contents and methods in educating mid- and high-level agricultural personnels in order to cultivate new agricultural personnels who were in line with and adaptable to the development of the era. On entering the 21st century, especially since the Japanese government putting forward the strategy of “Six Innovations in Agricultural Industrialization” in 2010, Japan has started to carry out the movement of “Six Innovations in Agricultural Industrialization” again, in order to cultivate personnels. In achieving this goal, many agricultural colleges have broken the limitations on the measures of agricultural education, actively introduced the new technology and new concept of the second and the third industry, developed an educating system with the goal to improve the students’ comprehensive ability, cultivated interdisciplinary agricultural personnels with sound professional knowledge and strong comprehensive ability. In this way, the level of agricultural science and technology was considerably upgraded as a whole (Yin, 2020).

Nowadays, the development of agricultural economy needs high-qualified personnels with innovative spirit. It means China needs industrial pioneers, excellent executives, outstanding managers and industrious labors (Li, 2004). Therefore, in the future, we should make a change to the long-term traditional agricultural education which focuses on cultivating cadre personnels, and cultivate more and more agricultural personnels who can adapt to the development of industry and regional economy. Colleges and universities should set their orientation for the cultivation of agricultural personnels in accordance with their own running basis, their own features and the development levels of their regional economy and society, and scientifically set the cultivating objectives according to the specific demands for personnels in terms of regional characteristics, agricultural economy and other related industries.

In the surrounding areas of big cities, with the goal of developing city style agriculture, the agricultural development should meet the needs of the city residents’ life, should be efficient in water saving and greening plants growing. In cultivating personnels for such regions, students are expected to lay a solid foundation in basic knowledge studying and field practice, and are expected to graduate as high-qualified, application-oriented and interdisciplinary personnels.

#### **4.2. Develop a Scientific and Systematic Program for Cultivating Professional Personnels, and Make a Top-Level Design for Cultivating High-Level Agricultural Personnels**

In recent years, in order to get students strongly interested in agricultural education and to reduce the dimission of the agricultural personnels, and to attract

more qualified innovative personnels, many agricultural colleges and universities in Japan have canceled the strict boundaries between general education and professional education, integrated them and interpenetrated the contents of general education and professional education and knowledge of natural science and humanities. It has considerably improved the dull and boring situation of agricultural education and aroused students' great interest in studying agriculture (Zhou, 2012). In order to widen the students' professional knowledge and satisfy the increasing demands for more qualified graduates, a number of colleges and universities in Japan have divided their majors into more branches in a more professional way, which, as a result, has fulfilled the needs of the development of modern agriculture in Japan (Wang, 2000).

The colleges and universities with agricultural studies in China should, first of all, make regular surveys of the changes in agricultural economy and the progress in concerning industries, and based on the result of these surveys, design and open new majors in urgent needs, and bring a stop to those majors which are no longer in need. And secondly, with reference to the suggestions given by scholars in the fields of agriculture, industry, businesses and education, colleges and universities should make or make amendments to cultivating plan in a scientific way, so as to integrate cultivating plan with general knowledge education, specialty education and field practice, and respectively display their full strength in the course of personnels cultivation. Colleges and universities should cultivate high-level agricultural personnels with good communication ability, cooperation ability, management ability, high level of cultural accomplishment and international vision by way of general education and professional education, integrate the cultivation of innovation ability with modern agricultural science and technological knowledge. In carrying out the integration, the knowledge of agricultural economic management, agricultural products processing and production and circulation can be acquired simultaneously. And this can lead to the cultivation of broad caliber agricultural innovative personnels. By way of application-oriented teaching, students can deepen their understanding and comprehension of their professional knowledge, enhance their practical skills, and truly apply what they learn.

#### **4.3. Design Cultivating Curriculum in a Scientific Way, Update the Curriculum and Text Books with the Advance of the Up-to-Date Science Achievements**

In Japanese colleges and universities, agricultural courses and teaching contents have always been in a change with the advance of technology. In order to improve agricultural education, the Japanese agricultural education has carried out a great many reforms, including increasing teaching contents and updating courses. Since the 1990s, Japan has continually added corresponding courses and contents to its curriculum, including advanced courses like agricultural information processing, computer science, bioengineering, environmental control, production science, and production circulation, so as to meet the needs of the de-

velopment of information science and environmental science. Meanwhile, in schools of agricultural studies, courses on agronomy have been turned into new courses on biological resources, agricultural environment, agricultural economy, etc., and new majors like agricultural biotechnology, genetics and molecular biology have also been constructed (Wang, 2000). Aggressive adjustments to the make-up of courses and majors and updating teaching contents have always been laid great emphasis on to meet the needs of the new era in terms of cultivating agricultural personnels.

At present, with the economic globalization and the development of information science and internet technology, many traditional economic operation modes and management modes have been subverted. Agricultural production and the development of agricultural economy have also been impacted and challenged by what has happened in many fields. Colleges and universities should conform to the trend of the era and the development of science and technology, obsolete the teaching contents and information which are out of date, add new majors and new special courses to the teaching curriculum to satisfy the needs of the development of society and agricultural economy, construct new courses to impart emerging technologies and cutting-edge knowledge related to agricultural economy and industrial development, attach importance to the integration of agricultural professional knowledge and knowledge of other disciplines, constantly introduce new contents with the up-to-date technology of the era into the cultivation of high-level agricultural personnels, and promote the joint forces of personnels cultivation and new agricultural science construction, so as to provide important human resources guarantee for agricultural economic development to meet the challenge of the new era and new environment.

#### **4.4. Lay Emphasis on Field Practice and Build the Platforms for Teaching Experiment**

NAKANO, director of JA-IT, ever pointed out, "Excellent personnels are cultivated in field work." Constant attempts can turn ordinary personnels into outstanding professionals. Agricultural education in Japan pays special attention to field practice. There are a large number of practical courses in the teaching curriculum, so that students can put their theoretical knowledge into practice. In addition, students can practice in the teaching, research and practice facilities of the colleges and universities located on farms, horticulture laboratories, botanical gardens, veterinary hospitals, etc., to improve their ability to practice and innovate (Zhou, 2012). In class, they are students, but on farms for practice, they are farm labors. They are the main body of labors whose task is to carry out the farm production work.

It is self-evident that the practice experiment teaching plays an important role in the cultivation of agricultural personnels. In order to cultivate high-level agricultural personnels, more emphasis should be laid on field practice teaching like doing research experiments. Through field practice, students can not only



“know what it is”, but also “know why it is”, and meditate how to transform their knowledge into application in the process of practice. The problems of weak production and weak field practice in agricultural education of China are widespread (Li, 2004), which not only severely restricts the level of agricultural education teachers, but also affects the quality of agricultural personnels cultivated. Colleges and universities should take their own conditions of running schools into account, expand their teaching channels, and take farms and other attached teaching research and practice facilities as practical teaching platforms to carry out practice experiments, so that students can be widely involved. Students are required to practice in the nature to improve their practical skills. In doing so, their knowledge can be avoided to be too broad to be fine and deep. It is also the same with their theoretical study. They can not only acquire sound agricultural knowledge, but also can systematically enhance the practical skills. What’s more, it can familiarize students with the agricultural life, strengthen their minds and cultivate their feelings towards the rural life and agriculture.

#### **4.5. Take Effective Measures to Cultivate Agricultural Personnels in Cooperation with Universities, Enterprises and Local Governments**

While attaching importance to practice teaching activities like field practice and experiments, Japanese higher agricultural education also attaches importance to the cooperation with enterprises and industries. The forms of cooperation include: Universities and colleges may accept the authorization of enterprises to carry out application project research, directly train urgently needed personnels for the industrial fields, provide technical services for the industrial departments, and send professors to serve as consultants for the industrial departments. These cooperations can not only make university agricultural education always focus on the development of agricultural modernization, but also ensure that personnels cultivated in colleges and universities can fulfill the needs of enterprises and industries. It can also enable university teachers to grasp the forefront trends of industry in a timely manner.

Therefore, it is necessary to build an open personnels cultivating platform, to strengthen the cooperations between universities and local organizations, to enhance the cultivation of specific admissions and other diversified cultivating ways, and to cultivate high-level personnels needed by modern agriculture by way of the cooperation between universities and local governments, schools and enterprises. The first of all is that it is necessary to establish a sound and feasible school-enterprise cooperation mechanism to ensure the “flow in” and “flow out” of personnels, so that students can receive on-site guidance from experienced teachers on the front line of enterprises, realizing the mutual complement and connection between theoretical knowledge and practical skills in practical work. Secondly, an effective cultivating and monitoring mechanism should be developed, and the practical performance should be included in the assessment and



evaluation of students' performance, and the monitoring of personnels cultivation quality and guarantee mechanism with "the combination of curriculum, practice, academic tutors and enterprise tutors" should be set up.

#### **4.6. Put Emphasis on the Cultivation of Teachers and Improve the Quality of Cultivating Agricultural Personnels**

Japanese agricultural education teachers are subjected to strict teacher admittance regulations. Teachers with qualification certificate have to pass written examinations on pedagogy and agriculture and pass an interview before taking up a post, and new teachers are required to study two days a week inside campus and one day a week outside campus, in order to improve their quality and teaching ability of engaging in education work (Wang, 2000). In addition to related national laws and regulations, Japanese agricultural colleges and universities also have many internal regulations, such as Regulations for Agricultural Research and Regulations for Agricultural Research Committee, to regulate all aspects of teaching activities and teachers' behaviors, so as to build a high-qualified teaching staff. In order to adapt to the diversification of university education and cultivate practical personnels needed by the agricultural industry, Japan has also set up a special teacher training system with the purpose of absorbing those who do not have a teacher qualification certificate but have rich practical work experience into the education field.

Cultivating high-level agricultural personnels requires high-level teachers with both rich theoretical knowledge and practical experience. In order to achieve this, we should, first of all, lay great emphasis on the cultivation of teachers and improving their theoretical and practical ability. Secondly, we should try every means to recruit capable teachers and improve the academic level of in-service teachers by encouraging policy incentives, to increase their growth experience, and actively encourage them to do field work first, and then come back to teach after increasing their practical work experience. Teaching policy can be made to have teachers spend a certain amount of time each year on doing basic and scientific research. In fact, there is no lack of such examples in agricultural field these years. Li Bao-guo, a late professor from Hebei Agricultural University, buried himself in his mountain field for more than 200 days a year. His research subjects all originated from the front line of agricultural and rural work. According to the information derived from his actual field work, he made adjustment to his classroom teaching, integrating the scientific research achievements and practical experience with classroom teaching, providing classroom teaching with the most compelling and cutting-edge knowledge and information. The students cultivated by such teachers will undoubtedly become agricultural personnels with excellent theoretical and practical abilities, and the quality of agricultural personnels can also be guaranteed. Thirdly, colleges and universities should also create conditions to encourage teachers to strengthen information and technology exchanges with foreign colleges and universities, and to partici-

pate in agricultural academic seminars or international forums, so that teachers can timely grasp the cutting-edge development trends of their majors and acquire the latest professional knowledge and technical information.

#### **4.7. Do All Possible to Cultivate Students' Understanding of Agriculture and Occupation, and Strive to Improve Their Love for Agriculture and Occupation**

Due to the dirty, bitter and tiring nature of agricultural work and related professions, the professional employment rate of agricultural graduate is rather low, which is not only a problem in China, but also in Japan, a developed country. Many agriculture and forestry students turn to work in other industries on their graduation, and this phenomenon is best illustrated in the saying "To study agriculture is to leave it". In order to change this situation, Japan has taken the cultivation of self-employed agricultural personnels as the main target for its agricultural education reform from the beginning of secondary agricultural education. It has not only issued policies at the national level to guarantee it, but also given full support from different levels of governments (Zhou, 2012). Everything from college entrance examination to the everyday education, from the setting of agricultural education curriculum, to college life guidance, from human resources, to financial and material conditions, has been given strong support (Wang, 2000).

The author holds that the following measures can be taken to settle the problem of "To study agriculture is to leave it". First, take enrollment as a vital admission, aiming to attract and enroll excellent students by way of early admission policy or tuition reduction, thus achieving the optimization of agricultural major students. For example, in August 2006, a notice "On Furthering Standardization of Education Fees" was enacted in Zhejiang Province. The notice regulated, "Since the beginning of the enrollment in autumn, students of the province who enroll in agricultural majors and higher vocational college agricultural breeding technology majors are exempt from paying tuition." This policy has benefited 36 undergraduate college majors such as agriculture, forestry and horticulture, which is of great significance to attracting more high-qualified candidates and optimizing the quality of students (He & Miao, 2014). It also has a positive effect on the stability of the grass-roots agricultural staff after employment and the improvement of the overall quality and level of the agricultural industry. Second, create a supporting incentive mechanism and a good employment mechanism, so that agricultural personnels working in rural regions do not have worries about their future, and provide a platform for them to display their talents; so that students can become the practical personnels with a great space for rise and be willing to stay in their occupation. The third is to regularly carry out the education of occupation awareness and professional ethics to ensure students who learn farming love farming, not only cultivating students with a strong professional enthusiasm, but also freeing them from their dislike of dirty,

bitter, tiring working conditions. It is strongly suggested that students receive a certain psychological preset before engaging in agricultural work in rural regions.

#### **4.8. Implement Apprenticeship Mechanism, Tutorial Mechanism and Other Effective Educational Management Mechanisms Suitable for the Characteristics of Agricultural Majors**

Apprenticeship mechanism can be applied to cultivate students between universities and businesses. Tutor mechanism allows the best allocation of the number of students whose interests can match the tutors' research area, time schedule, ability and etc. In this way, tutors can teach their best specialties to students directly and students can turn into assistants of their tutors within a short amount of time. Tutor mechanism can also enable students to contact with their majors from the moment they attend colleges and universities, to develop their interests in their majors, achieving the goal of teaching students in accordance with their aptitude, and simultaneously promoting their ability of social communications and management skills. On carrying out his scientific and technological research work, professor Li Bao-guo once led his students to eat, live and work with rural labors, which turned to be the best case of the application of the tutor and apprenticeship mechanism.

#### **4.9. Focus on Creating Favorable Conditions for the Sustainable Cultivation of Agricultural Personnels**

Agriculture is developed in a sustainable way, so is the agricultural personnels cultivation. University education should not only "Give fish to students", but also more importantly "Teach them to fish", so that students can develop an immediate awareness of updating their knowledge and skills according to the calls of the new era and agricultural industry. Japan attaches great importance to the enrichment and updating of agricultural education facilities such as electronic biological microscopes, and some institutions even sponsor young people to go abroad to study foreign advanced technologies. In China, institutions or departments at all levels should make corresponding policies and strive to create good conditions to provide opportunities for grass-root agricultural personnels to continue their education. Open public lectures, opportunities for personnels to go back to university to further their study, on-site cultivating guidance and special training on urgent projects can be offered to agricultural personnels who are from rural regions to ensure their "life-long education". At the same time, the amount of funds should be increased to provide agricultural personnels with opportunities and conditions to improve their professional knowledge and technical skills with the advance of the era.

### **5. Conclusion**

High-level agricultural personnels can not only promote the development of

agricultural economy, but also drive and lead the upgrading of agricultural industry and the development of rural economy, improve the quality of agricultural labor force, improve the level of agricultural development and agricultural production capacity. This is an important guarantee for forging a powerful and booming agriculture. At present, The Chinese Communist Party of China and the state attach great importance to the development of agricultural and rural regions, and also attach great importance to the cultivation of personnels in agriculture and rural regions, which endows this study with strong social and practical significance.

First, human resource is primary resource. The experience of developing agricultural economy in developed countries, Japan in particular, is also a proof that human resource is the most important resource in responding to any demand. Therefore, studying how to cultivate high-level agricultural personnels plays an important part in promoting a sustainable and scientific development of agricultural and rural economy and building a well-off society in the future. The contents of this study are expected to arouse the attention of respective government departments and universities to the cultivation of high-level agricultural personnels to a certain extent. It has positive social significance for improving the environment in which agricultural personnels are cultivated.

Secondly, high-level personnels are the first productive force, and cultivating high-level agricultural personnels is an important necessity in implementing the strategy of strengthening China by personnels. It is the function of colleges and universities to serve the national strategy of uplifting our economy with high-level personnels, and to operate the social functions by way of cultivating personnels. It is the responsibility and obligation of colleges and universities to cultivate more and better high-level agricultural personnels for the development of agricultural economy based on the characteristics of agricultural development of its own country and the experience and lessons of other countries in agricultural education. From different perspectives, this study discusses the cultivation of high-level agricultural personnels in a relatively systematic way. The proposed countermeasures can provide some insights and reference for colleges and universities to cultivate high-level agricultural personnels, to improve the quality of agricultural personnels cultivation. And this is of practical significance in present China.

### Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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