Study and Practice on "WEB +" Agro-Technique Extension Method
Beijing Agricultural Science and Technology Information Consulting Service Center for Example

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Abstract: The new extension ways are needed to develop constantly for agricultural science technique service. The connotation of "Internet (WEB) +" agro-technique extension method, the participants, clients and services, platform and system components etc. are studied in this research. The WEB+ agro-technique extension method is summarized and analyzed in the case study of Beijing Agricultural Science and Technology Information Consulting Service Center. It is considered that the method could accelerate the promotion of agricultural scientific and technological achievements 1.5-2 years averagely, reduce the cost of promotion 50%-70%, support agriculture industry development and improve the quality of farmers. Because it is fully used the advantages of information technology in the dissemination of technology diffusion, combined with the offline services of traditional agricultural extension, the method fits with the current national information development strategy and national basic conditions. There is also some limited factors and obstacles for the development of this method, which need continue to explore through the mechanism and management innovation, and continuous development and improvement. It can promote the transformation of agricultural science and technology achievements, and also is useful for promoting the innovation of agricultural technology extension method.

1 INTRODUCTION

Following the continuous progress of the national strategy of information, the Internet and information technology in the field of agricultural science and technology service are rapidly develop and widely used. The "last mile" problems of science and technology information service in the rural areas have been solved constantly (Gaochao Yang, et. al, 2000, Wei Chen, et. al, 2013). However, most of farmers could just accept the information service passively due to their various limitations. The more convenient information services are needed to enable them to fully access the modern information service (Qijie Gao, 2008, Shuiling Zhang, 2014).

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Beijing Agricultural Science and Technology Information Consulting Center has been set up based on the abundant science and technology resources of Beijing Academy of Agriculture and Forestry Sciences. It has been supplied a range of agricultural science and technology information services in recent years, and also has achieved positive results in promoting the transformation of agricultural scientific and technological achievements by using the "Internet +" agro-technique extension method.

1.1 Concept of "WEB+" Agro-Technique Extension Method

"Internet +" (hereinafter referred to as the WEB+) technology extension method, is to "Internet" as the main channel, with Internet and information technology, build service platforms and systems, through the allocation of resources + offline

services, to deliver to the farmers of agricultural scientific and technological achievements, to reach to the results falling into effect to achieve the purpose of the promotion of agricultural science and technology.

1.2 Connotation of "WEB+" Agro-Technique Extension Method

With the advancement of rural informationi-zation, the Internet application in the field of agriculture increased greatly. "WEB +" agro-technique extension method is using the current extremely developed Internet and information technology to do the agro-technique extension works in electronic way. Among the method, the core part is the application of agricultural scientific and technological achievements, and "WEB +" is the extension way.

In this method, the "WEB" refers to the information network related services, "+" refers to the "WEB" outside the promotion supports and offline services, such as base model, expert guidance, technology training, etc.. Among them, "WEB" includes varieties of channels connecting the extension of supply and demand. Through these channels, on the one hand, the agricultural science and technology achievements spread out, on the other hand, through the need to investigate, feedback and docking, to grasp the needs of farmers' scientific and technological promotion. "+" is a useful supplement to "WEB". By the experts as the core of a variety of ways to support WEB underline, to promote the full service. The two is a good combination of modern information technology and traditional agricultural technology promotion, complement each other.

2 RESEARCH OF "WEB+" AGRO-TECHNIQUE EXTENSION METHOD

2.1 Participants

Agricultural extension is the activity of science technique education, with farmers as objects, education as the means, and the main contents include new knowledge, new technology, new skills and new achievements. Therefore, it needs all subjects of agricultural science technique extension to participate (Qijie Gao, 2008). In general, agricultural technology extension system is

consisted with government, universities, research institutions, enterprises related to agriculture, rural cooperative organizations and farmers (Juan Liu, 2007). In the "WEB+" agro-technique extension method, "WEB" is the main line connecting the supply and demand of extension. The main body of the method mainly includes:

(1) Objects related to "WEB" promotion, including the object who make the agricultural achievements, mainly is the universities, scientific research institutions and other units related to the agricultural science and technology achievements. Web system organizers includes government, research institutions, enterprises, cooperative organizations etc.. All of them participate the construction of agricultural information networks. The agribusiness, cooperative organizations, associations, agricultural workers and individual farmers with the web application conditions are the service objects.

(2) The object related to the underline service. This part is for the people that not use or use very few WEB services, mainly includes the experts who give the agricultural technique service, organizers (such as governments, enterprises, cooperative organizations, etc.) and individual farmers. The main body of the WEB related objects may coincide, or may be part of the separation or partial of the object related to the underline services.

2.2 Service Objects and Contents

2.2.1 Service Objects

"WEB+" agro-technique extension method is a development of traditional agricultural technology promotion methods, the service objects include all agricultural production operators, including industry farmers, members of agricultural cooperatives, employees of agricultural enterprises, agricultural technicians, agricultural employees, agricultural production and operation management personnel. It also includes the service agronomists who are engaged in agricultural technology, basic agricultural science and technology personnel, local experts and other social public.

In this method, these people who can receive technical achievements and extend the achievements to rural areas, play important roles in the agricultural technique extension works by using the "WEB+" in a variety of ways. Many technologies need to be received and digested by them, and then are spread to ordinary farmers, therefore, they are the objects of this method focus on.

2.2.2 Service Contents

In practice this method covers not only traditional agricultural extension services, such as application of new varieties and new varieties, practical agricultural technology extension service, agricultural technical FAQ (Qijie Gao, 2008), but also includes that originally not belonging to the traditional agricultural extension service category, including: Agricultural related policy and advisory of development planning etc. agricultural products, market services such as advisory service about market information and marketing of agricultural products, marketing promotion of agricultural products using public platform like network or WeChat, and so on. A timely response and post disaster self-help services for agricultural natural disasters are also part of the works. Besides, food safety issues and other major issues of agricultural public consultation and supervision and organization of agricultural science and technology exhibition, observation and learning activities and other public communication are also an important part of the services.

2.3 Service Platforms and Ways

2.3.1 Service Platforms

(1) Internet platforms and systems based on WEB, including: agricultural database, agricultural information service websites, agricultural expert service systems, remote video service systems, etc..

(2) Hotline service systems based on Internet and telecommunication network. Through Internet and the traditional telephone network to carry out services. The telephone service is combined with computer technology, to achieve "listen to the network", Such as, Agricultural Technology 110, 12396 Spark Technology Hotline.

(3) Service platform systems based on mobile communication network, including rural mobile information network, Wechat, mobile QQ, etc..

2.3.2 Service Ways

The service system includes the following services based on "WEB" and the offline services based on experts. The online services based on the "WEB" include:

(1) Website promotion and online consultation. They work through agricultural website online advice column or function module, to promote commercial varieties, planting and breeding technology, and answer questions raised by the online users.

(2) Remote video Q & A service. It works through the remote two-way video consultation system of Internet, to answer the users' questions and help them solve the technical problems in the extension work and production, and give a scientific and reasonable solution.

(3) Instant communication solutions. According to the demands, the questions related to the user's technology could be real-time answered by using QQ, Wechat and other instant messaging tools. With the popularity of smart phones, mobile terminal APP has entered the field of science and technology services.

(4) Short message service. The production related technical guidance, information query, and Q & A are provided to the farmers through mobile phone text messages or network messages. And market and warning information for agricultural production are also provides to farmers according to farming season.

(5) Telephone voice service. Mainly through Internet, the fixed telephone, mobile phone and other communication tools, it provides the relevant information about agricultural science and technology, technology and other services for telephone users. Even in non-duty hours, it can also be achieved through the three party calls.

Offline services based on expert resources includes:

(1) Trial base model guidance: It can help the transformation of the technology achievements. Demonstration content not only includes the traditional new varieties, agricultural application technology, but also includes specifically for the application of information technology, like a precision agriculture demonstration base, information service demonstration base.

(2) Field consultation: Experts go to the field to solve the complex problems which cannot be solved online, and also make the timely understanding of the objects' needs become possible.

(3) Agricultural science technology training: The technical training could improve the promotion efficiency, and also develop farmers' vision, to enhance scientific and technological awareness, and promote the application of new technologies, new results of the enthusiasm. The training includes practical technical seminars, as well as the field practical guidance, technical application drills, etc.

(4) Survey on agricultural science technology demands: Technicians are organized to the

production line and the fields to guarantee online service met the needs and works effectively.

2.4 Experts Team and the Service System

Expert is human base or important resource of "WEB+" agricultural extension. The experts team need to cover all of the professional field, to provide full services, and also a relatively stable personnel. Considering the practical and complex problems of agricultural science and technology, the experts should have rich practical experience in addition to a solid theoretical foundation. It is also needed to pay attention to the cultivation of young experts, to take a new way to build up a reasonable distribution of the ages and technical titles. The service system also need to work continuity.

Considering service system construction, this method requires higher technician levels. On one hand, application of the method needs to employee with the Internet and information technology. On the other hand, the system playing a key role in rural areas and need messenger and staff to carry out technical communication service in different objects, they need to understand the rural area very well. Therefore, it is necessary to make more Inter-disciplinary talents to participate in implementation technology.

3 APPLICATION OF "WEB+" EXTENSION METHOD

3.1 Beijing Agricultural Science and Technology Information Consulting Service Center "WEB+" Agro-Technique Extension System Construction

3.1.1 Platforms Construction

Beijing Agricultural Science and Technology Information Consulting Service Center relies on the abundant agricultural science and technology resources of Beijing Academy of Agriculture and Forestry Sciences. The modern information technology has been used as the carrier, and we have created a comprehensive, multi-level and three-dimensional agricultural technology extension service system (He Meng, 2009) (Figure 1), which is composed of scientific and technological information resource construction system, "WEB+"

agro-technique extension system and receiving transformation system. These systems use modern information technology such as communication technology, multimedia technology, information technology, network development technology, software and hardware system development technology, etc., with the assistant of the Internet, telecom network, mobile communication network, and finally are used by the production and business groups. At the same time, feedback information, service and demand feedback are received constantly by using the system architecture, which is useful to promote transformation of agricultural scientific and technological achievements.
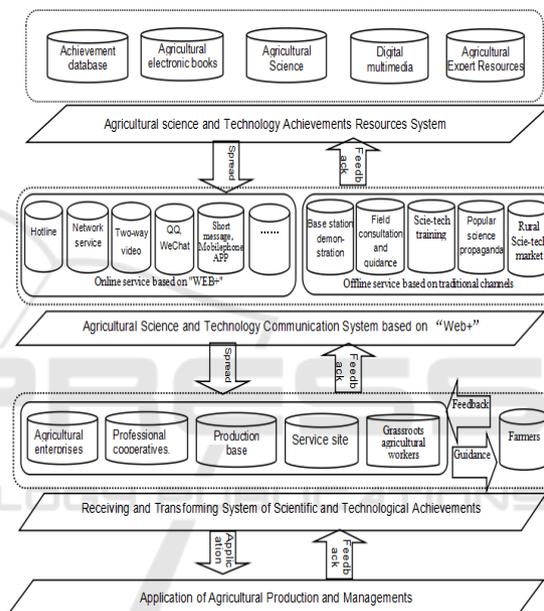

Figure 1: Beijing Agricultural Science and Technology Information Consulting Service Center "WEB+" Agro-technique Extension System Framework.

3.1.2 Experts Team and the Service System Construction

In Beijing Academy of Agriculture and Forestry Sciences, experts of 14 research institutes (Centers) act as key players, we also absorb the scientists of Beijing agriculture related institutions, China Agricultural University, Beijing University of agriculture, Beijing Vocational College of Agriculture and other agricultural universities, and expert resources of Chinese Academy of Agricultural Sciences and other central Research Institutes in Beijing, Beijing Agricultural Science and Technology Information Consulting Service Center has constructed agricultural extension service experts team according to the demands, through a

standardized procedures "department recommended - professional assessment - monitoring and evaluation ", which covering policy, engineering, markets information and agricultural science and technology of planting, breeding and other multiple categories of more than 20 categories, and up to more than 150 people till now.

In the system construction, fully cooperating with government, relying on the existing rural scientific and technological information service system, a clear framework comprehensive service system has been established in the suburb of Beijing County, township, village community,. With "City, county, township and village" four level network skeleton, and more than 600 information service sites and two-way video terminal nodes which set up in the rural areas of Beijing. It has achieved efficient operation with more than 4000 omnipotent agricultural technicians throughout villages of Beijing suburbs, the establishment of the improve the dissemination of agricultural science and technology, diffusing and service network. Take the omnipotent agricultural technicians at the grass-roots as the servicing key body, according to their own situation, with no increase of the hardware, suitable technology services are customized for them, to make the agricultural technology popularization into the villages, households, to personnel anytime and anywhere.

3.2 Extension of the Method

3.2.1 Multi Way Extension

Media propaganda, the magazine cooperation construction column and so on have been used for promote the method. The "Science and Technology Daily", "Farmer daily", "Beijing Daily", "Beijing Suburb Daily" reported more than 10 times. And sections like "you have questions to answer", "practical hotline" have been held more than 40 times in "Beijing Suburb Daily". A section of "Consultation Hotline" has been hold in the journal "Vegetables" for more than 30 times. The modern media, such as the website link, website floating windows, Baidu Library, Baidu entry, Mobile two-dimensional code, etc. are also used for promotion of the services.

Face to face publicity. Leaflets, brochures, promotional stickers, promotional bags, are assigned directly to the users, using of agricultural technology training, and technical services, organizing science and technology markets, and agricultural exhibitions to demands. More than 60000 copies promotional materials have been issued to the users.

3.2.2 Actively Promote the Application

The first is to promote the application of this method in rural areas of Beijing through the service center. Since 2009 the center has established more than 600 demonstration bases and more than 20 service sites in suburbs of Beijing. More than 10 million people have been served through telephone hotline, website, mobile phone text message, two-way video, Wechat, QQ and other various channels service means. The service has covered all of the villages in Beijing. The County suburbs agriculture cooperatives, key agricultural enterprises, base etc. all kinds of organizations to more than 8000 have been fully covered.

The second is to promote the application through cooperation between Beijing Academy of Agricultural and Forestry Sciences (BAAFS) and districts (county) or between BAAFS and government departments, because they play different roles in the scientific and technological promoting works. In these programs the districts play roles of organization and coordination, BAAFS plays the role of providing technical supports, and jointly promote the promotion of applications in the county, to meet the demands of science and technology of rural farmers. The cooperation between BAAFS and Beijing Agriculture Bureau of promoting agricultural engineering technology, both has enhanced the village technical team, and promoted demonstration and application of the service method, has achieved double win cooperation.

The third is based on Beijing-Tianjin-Hebei area, radiation across all over the country. It has established cooperative relations with part of the Tianjin and Hebei's counties. With taking co-exhibition or other models, we promoted the service in Beijing-Tianjin-Hebei area. Users in the area have reached 75% according to statistics. With the advantage of internet and other nets' wide coverage, the service has covered our country's 31 provinces and autonomous regions up to now.

3.3 Effects of Extension

3.3.1 Economic Effects

The method has been applied for five years by using websites, telemarketing and experts, automatic speech, two-way video, mobile phone text messages, Wechat, QQ and other web related service ways. More than 18 million users have been serviced,

covering the national 32 provinces' 300 multiple local city. Nearly 300 times scientific and technical advisory service and training have been carried out, more than 15 thousand farmers have been trained, 60 thousand copies technical materials, more than 5000 books have been provided to the farmers, more than 30000 scie-tech production questions have been solved; promoting more than 120 vegetable, fruit trees, crops varieties, more than 30 livestock and poultry, aquatic breeding varieties, more than 420 of the advanced and applicable technologies have been popularized. Service has covered about 2 000 000 acres of planting, 3 700 000 breeding individuals, achieved economic benefits of more than RMB 300 million.

3.3.2 Social Benefits

The first is to accelerate the promotion of agricultural scientific and technological achievements. According to estimates, Beijing Academy of Agricultural and Forestry Sciences promoting its own practical technology through the "WEB+" approach, and an average of 1.5-2 years could be saved during the promotion. And for the new seeds 2-3 years could be saved.

The second is to reduce the cost of promotion of science and technology. Fully using the advantages of network of its rapid spread, "WEB+" agro-technique extension method has made many experts don't need to on the site to solve the problems, can greatly saved time and cost about 50% - 70%.

The third is to support the industry development. A large number of agricultural scientific and technological achievements of BAAFS have been transformed through WEB+ by the center, especially for vegetables, fruit, facility agriculture achievements, have been widely used in the suburbs of Beijing, Hebei, Tianjin and North China area.

The fourth is to improve the skill level of farmers. In the process of "WEB+" application, through the promotion of a variety of modern information technology and technology training, farmers' perspective has been expanded, some new technologies have been applied, effectively improve the overall technique level of farmers.

4 ANALYSIS AND DISCUSSION

4.1 Innovative Analysis of the Method

4.1.1 Multi Channel Innovation of Agricultural Technology Extension Service Mode with Low Cost

Formed a multi channel of agricultural extension service with "phone + computer + mobile + mobile terminal + offline services" collaborative application, with the widely used Internet, telecommunication network and mobile communications network. Low cost service has been set up and one of the ways can be access by the user, and effective extension of the science and technology promotion service channels and improve the coverage.

4.1.2 Standardized Progress of Sci-Tech Achievements Promoting

With the existing four level technology promotion system in county, township, village, and households, drive on the application of "Propaganda+ Cooperation+Application+Feedback" standardized process to promote agricultural information integration service platform and the application of agricultural technology.

4.1.3 Innovation of Agricultural Extension Service Mode of Multi-level

In practice, this method has created five kinds of technology promotion service mode, which should be in season, meet the demand, directional docking, cooperation driven, and the radiation driven.

4.2 Discussion

4.2.1 Development of the Method

The agricultural technology demand is fundamental direction of "WEB+" extension method. The technology requirement of production is fundamental power of its development and application. Therefore, regardless of how the development of web related information technology, agricultural science and technology demand is fundamental motivation of the application of the method. We should avoid one-sided pursuit of application divorced from reality.

Information technologies are the technology supports of the application of this method. No

modern information technology to build varieties of new communication channels, platforms and systems, has the method no advantage in the application of the conditions.

The convenience application is the premise of the development of this method. Rapid and convenient communication are its advantages of modern information technology. Considering the lax of the traditional agricultural extension system and low efficiency of the promotion work, there is a very good prospect for this method application.

4.2.2 Management Mechanism Analysis

The "WEB+" extension method and service is essentially a public service. In the case of ample funds, it is needed to actively expand the business, to seek new service objects and open up new service areas according to the needs of service development. And it's difficult to profit as a public service. Therefore, this method is actually the extension of the government science and technology extension service function, so it must get supports of the government.

The service system and operation mechanism involved in the method need to be explored for a long time. This method is based on the existing functional system and personnel, although in the process we have built our own service stations and terminals, but they are mostly relied on the construction of scientific and technological projects, lack of continuous operation and maintenance funding is obvious. In order to solve the problem of funding, personnel and other mechanisms involved in the process, we should actively promote social services to explore ways to promote more social organizations to participate in the process.

5 CONCLUSIONS

"WEB+" Agro-technique Extension Method is fully used the advantages of information technology in the dissemination of technology diffusion. It combines with the offline services of traditional agricultural extension, fits with the current national information development strategy and national basic conditions. Therefore, the method has a certain space of survival and development needs. With the research and practice of big data, cloud computing and mobile Internet, the application of the WEB related information technology in the field of agricultural science and technology is becoming more and more extensive. The application of this method will help

to further promote the innovation of agricultural technology extension method. There is also some limiting factors and obstacles for the development of this method, which is consistent with China's current basic agricultural conditions. In practice, we need continue to explore through the mechanism and management innovation, and continuous development and improvement. It is needed to promote the field application of agricultural technology by using modern information technology.

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