Research on the development and preliminary application of Beijing agricultural sci-tech service hotline WebApp in agricultural consulting services

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Abstract. To deal with the "last kilometer" problem during the agricultural science and technology information service, we analyzed the feasibility, necessity and advantages of WebApp applied to agricultural information service and discussed the modes of WebApp used in agricultural information service based on the requirements analysis and the function of WebApp. To overcome the existing App’s defects of difficult installation and weak compatibility between the mobile operating systems, the Beijing Agricultural Sci-tech Service Hotline WebApp was developed based on the HTML and JAVA technology. The WebApp has greater compatibility and simpler operation than the Native App, what’s more, it can be linked to the WeChat public platform making it spread easily and run directly without setup process. The WebApp was used to provide agricultural expert consulting services and agriculture information push, obtained a good preliminary application achievement. Finally, we concluded the creative application of WebApp in agricultural consulting services and prospected the development of WebApp in agricultural information service.

1 Introduction

The popularity of smart phones and continuous development of mobile internet provide a broad prospect for mobile application service of agriculture. According to “The 39th Statistics Report on Internet Development in China”[1] released by China Internet Network Information Center, the number of netizens in China reached 731 million by December 2016, of which rural users accounted for 27.4%, about 201 million. The mobile phone become the main approach to access the internet, which was used by 95.1% of the netizens approximately that increasing at the rate of 10% for three consecutive years. Users, especially agricultural users, have an increased demand for agricultural information consulting services through mobile phones, and the era of consulting agricultural science and technology information via mobile internet has arrived.

1.1 Current status of agricultural mobile consulting services

At present, there were many ways to access the agriculture information, such as hotline, Native App, WeChat public platform and QQ group [3]. Among them, the mobile phone App was the most popular way, due to its specialization and customized for agriculture users. But we confronted many difficulties in the process of promoting mobile Native App. On the one hand, without necessary training and guidance, villagers have difficulty in downloading, register, and operating the App as they obtained relatively less education in the country, meanwhile, they have the resistance psychology when install a new App in mobile phones with the mobile RAM (Random Access Memory) restrictions. On the other hand, as the Native App was weak compatible, the programmers have to
develop many versions to meet the different operating systems, such as iOS, Android, Windows Phone, Symbian for the same App, which adds considerable effort and cost for the company to maintain and upgrade the different versions.

1.2 Advantages of WebApp in agricultural consulting services

With the maturity of HTML5 technology, web-based App has been recognized by an increasing number of users for excellent user experience and interaction. The concept of WebApp was proposed by Google when designing Chrome. It is a Web-based application that can complete one or more tasks across the network (Internet or Intranet) by using Web and Web browser technology \(^2\). In general, Web App is running on the network and standard browser, based on web technology to achieve specific functions of the application. It can better adapt to different resolution of the mobile phone screen than the Native App and has the following advantages:

The WebApp provides lots of convenience in the using process. Firstly, users can directly consult problems without download and install the application, as it can be combined with the WeChat public platform which was the most commonly used by net citizens \(^1\). Meanwhile, the combination of WebApp and WeChat public platform can make up the defect that WeChat public platform cannot automatically contact the users after 48 hours. Secondly, WebApp can dynamically control the system updates, including repair system bugs and add new features, so that users can use the latest version timely without frequent update. Thirdly, users can use the phone based on any operating system, as the WebApp’s good compatibility. Finally, user can have a good experience, since the WebApp can be linked to each other as a traditional internet page, jumping directly from one WebApp to another, while the Native App is relatively isolated in the current use scenario.

There are also many advantages in application development aspect. First and foremost, programmer needn’t to develop multiple versions for different mobile phone operating systems, which can greatly reduce the workload, due to the WebApp compatibility. Besides, compared with the Native App, the WebApp has the advantages of easier development technology, lower cost and higher efficiency. Last but not least, the WebApp can be updated timely, since it can bypass the strict submission and update review rules of App store \(^3\).

1.3 The necessity of developing Beijing Agricultural Sci-tech Service Hotline WebApp

12396 is the rural science and technology information service hotline built by the Ministry of science and technology and the Ministry of information and industry nationwide in China. "12396 Beijing New Rural Technology Services Hotline (‘Beijing Agricultural Sci-tech Service Hotline’ for short)" is established by the Rural Development Center of Beijing Municipal Science and Technology Commission and Beijing Academy of Agriculture and Forestry Sciences \(^4\). And it is a science and technology information service integrated platform for agriculture, and provides agricultural technology information consulting services by more than one hundred experts with rich theoretical and practical experience. Beijing Agricultural Sci-tech Service Hotline service has achieved remarkable results, and needs to expand the service channels and establish service brand as fast as possible. The popularity of smart phones and the development of mobile internet provide a broad prospect for agricultural mobile application services. It is particularly urgent and important to combine the modern information technology, to make full use of service hotline, and to provide scientific and technological information for the farmers. Beijing Agricultural Sci-tech Service Hotline WebApp, a new powerful tool of agricultural information mobile service, makes farmers and experts seamlessly integrated on mobile phone. It can broaden the service channels, make the service more convenient and efficient, reduce the cost and accelerate promotion, enhance the brand and upgrade the image, and enhance the trust of public.

2 Platform development

Combined with the requirement investigations, the WebApp was developed following the principles of more convenient for customers using, more efficient for experts response and easier maintenance for
service staff. The WebApp was developed mainly to solve two problems. One is how to provide more convenient services for agricultural technicians and farmers and enhance the brand image of the Beijing Agricultural Sci-tech Service Hotline via WebApp. The other one is to facilitate the experts to response the questions more convenient and efficient. In order to solve the above two problems, we designed and developed the "user consultation channel" and "expert service channel" based on HTML and JAVA technology.

2.1 User consultation channel
User consultation channel is developed for users to quickly consult problems, mainly consists of four sections, i.e., quick consultation, questions & answers highlights(Q&A), points statistics and personal center. Following the multi-way quick consultation principle, the quick consultation section integrated four consultation ways, i.e., telephone, message, QQ and reservation, to satisfy the individual demand of the user. What's more, the user can evaluate the expert's reply via the user consultation channel. User can directly communicate with the experts and get the reply prompt by the phone calls, which is a convenient and efficient way. By message consulting, the user can describe the problem in written form and upload the problem-related photos to show the disease or pest clearly for the experts to diagnose. A large number of people engaged in the same agricultural area in the QQ group, customers can exchange experiences with each other to know the agricultural trend. Reservation is the fast way for users consulting specified expert, making it possible for expert contacting with users directly and knowing the demand of users.

Q&A section collects the counseling questions together of all users. Users can browse and refer to questions according to the agricultural field, which can expand the user’s knowledge of the relevant agriculture areas, and help users avoid the similar problems.

In order to improve the enthusiasm of the user to consult questions, and increase the activity of the platform, the WebApp will reward users with points each time they use. Users can obtain point via continuous login, consulting questions, sharing the WebApp with friends or taking part in the activities organised by the platform. The point can exchange agricultural technology books, USB flash disk and small agricultural gifts in the application. Users can set the personal attributes, including the individual nature, region, agricultural field, and other information in the personal center, which can provides a reference direction of diagnosis for the expert.

Figure 1. Interface of the user consultation channel(left: quick consultation right: Q&A)
2.2 Expert service channel
Expert service channel was developed to improve the expert response efficiency so as to deal with the problems of users. The expert can receive the requirements of users quickly and answer the questions by the expert service channel, as the system pushed the questions to the related expert account automatically according to the agricultural areas. What’s more, the expert service can record the number of answered questions, corresponding points and the evaluation from users.

To improve the quality and quantity of the expert team, expert service channel provide a registry entry for the person who want to become one of Beijing hotline advisory experts. The one only needs to submit his information of work place, specialized agricultural area, professional title and contact way can be a registration specialist. To ensure the authenticity and authority of expert on the platform, the back-office staff will contact the expert one by one to ensure the submitted information was correct.

![Image](Image)

**Figure 2.** Interface of the expert service channel (left: unanswered question interface. right: expert registration interface)

3 Platform extension
The promotion model of "online and offline" was used to enhance the advisory service influence of Beijing Agricultural Sci-tech Service Hotline WebApp so as to earn more loyal users. Online promotion: the two-dimensional code of Beijing Agricultural Sci-tech Service Hotline WebApp was extended to get more users and greater influence through Beijing Agricultural Sci-tech Service Hotline websites, micro-blogs, community forums and other ways. Offline promotion was accomplished by the Beijing Agricultural Sci-tech Service Hotline countryside training. Beijing Agricultural Sci-tech Service Hotline community service and special presentations, science and technology weeks, which increased the number of online users.

The performance of preliminary extension was good. The registered users include individual peasants, organization members, agricultural technicians, citizens, employees, researchers and others, which is shown in Figure 3. The analysis of users’ consulted issues is shown in Figure 4, most users care about agricultural technology and policy, in addition, information about achieving prosperity and market information also accounted for a certain percentage.
4 Conclusions and prospects

The innovation of this research is to construct a convenient way for agricultural mobile consultation, which improved the efficiency of solving agricultural production and management problems, made full use of limited expert and agricultural information resources, broadened the service channel of Beijing Agricultural Sci-tech Service Hotline, and improved the brand awareness and influence. The combination of WebApp and WeChat public platform can obtain the user’s name directly, which avoid entering the user name and password every login time and increased the security of WebApp network. However, the ability to get the local file of WebApp is weaker than Native Apps and the display of WebApp will be biased on different browsers, such as Firefox, IE and Chrome. Meanwhile, the quality of network transmission and bandwidth directly restrict the experience of WebApp’s user and make difference on data acceptance and transportation[2].

With the continuous development of mobile internet technology, the agricultural consulting service will undergo new changes. First and foremost, agricultural consulting service will be more diversified. It will not only provide agricultural technical information, but also offer the information of product display and sale, and the technical recommendations, providing a convenient way to promote scientific research to practical application. Secondly, the agricultural consulting service will become increasingly intelligent. With the rapid development of science and technology, mobile consulting service will be more intelligent and automated, and develop towards self service modules with intelligent voice recognition function. Last but not least, the agricultural consulting service will integrate the advantages of live technologies, which can display the products, online survey, dialogue interview, and online training simultaneously, providing more convenient and efficient scientific and technological information services.
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