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# Construction of E-commerce for tourism and agricultural products based on Internet of Things technology under the background of big data

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***Abstract:*** *With the rise of big data processing technology and agricultural product Electronic business platform (E-COMMERCE), the varieties and channels of agricultural product sales are becoming more and more diversified. It is not popular among the E-COMMERCE, resulting in users not being able to accurately find the products that suit them in the first time. Therefore, the agricultural product E-COMMERCE has become an important means to efficiently meet individual needs. Combined with the technical characteristics of the Internet of things (IOT) and the development trend of online retailers, it provides professional online logistics services and other value-added services throughout all links of logistics for logistics enterprises, suppliers, manufacturers, retailers, partners, customers, governments and banks. Based on the analysis of the current development status of China's agricultural tourism product online retailers, combined with the characteristics of tourism consumption in the era of experience economy, this paper puts forward the innovative development strategy of China's agricultural tourism product E-commerce.*

***Keywords:*** *Big data; Internet of Things; Tourism agricultural products; Online retailers*

## 1. Introduction

Since the reform and opening-up, China has further promoted the reform of agriculture and rural areas, increased agricultural subsidies, and improved the production and living standards of farmers, and made remarkable achievements [1]. There are many problems and weak links in the development of agricultural marketization due to factors such as rural basic environment, facilities and insufficient funds. How to promote the marketization of agricultural products trading and build an effective carrier of agricultural products information trading has become an outstanding problem to be solved urgently in the sustainable development of rural economy [2]. With the help of IOT technology, the application of big data will become a great opportunity for the design and sales of tourism agricultural products. The relevant agricultural departments of various regions can transform the information resources of customer behavior data accumulated on their platforms into actual value. This is also one of the biggest advantages of Online retailers over traditional commerce [3]. The advent of the Online retailers era has greatly promoted the development of the logistics industry to informatization and electronics [4]. Logistics online retailers has become an inevitable trend in the development of logistics industry in the future, but its future development mode and how to realize the transformation from physical logistics to electronic logistics by relying on information technology need our exploration and research [5]. At the same time, IOT technology, as a new wave of the world information industry, will inevitably make information technology more fully and thoroughly integrate into human society and provide information upgrading for human life and production services [6].

Due to the broadness and interactivity of the network, especially with the development and application of the APP client, scattered information such as customer messages, ages, occupations, telephones, etc. has been collected and sorted out, and a corresponding model has been established based on this part of information to support decision-making [7]. In the later development process of agricultural tourism products, we can use these knowledge and information to make accurate predictions, timely adjust the production and consumption of agricultural tourism products, and guide the future development trend of agricultural tourism products [8]. The development of IOT, especially the convenience of mobile IOT, has enabled IOT to begin to integrate with personal lifestyles and business operations. From the initial role of information acquisition, communication and entertainment, it has developed into the medical, education, transportation, agriculture, and tourism industries. The new role closely combined with manufacturing industry, manufacturing industry, etc., has gradually formed an

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emerging economic form [9]. According to relevant studies, online retailers is the most initial and important engine in the development of IOT, and the development of rural online retailers is an important opportunity for the development of rural tourism [10]. This paper proposes to build an e-COMMERCE for tourism agricultural products based on IOT technology, which can better meet the actual needs of agriculture and become an effective way to speed up the development of agricultural marketization.

## 2. Development status and algorithms

### *2.1. Development Status of E-COMMERCE of Agricultural Tourism Products in China*

With the development of Alibaba-based online retailers, IOT shopping has become an upsurge. At present, nearly 600 million Chinese netizens are an important force to promote the further development of online retailers in China [11]. The continuous development of IOT technology has triggered a huge change in China's social and economic patterns. Among them, online retailers, as a product of the development of IOT, enables traditional business activities to achieve electronic and informatized coverage, and has successively formed a new form of convenient and fast electronic transactions. It has opened up a new channel for online sales. Electronic transactions can not only reduce business costs and increase revenue, but also quickly establish user loyalty, which is convenient for brand establishment and communication [12]. Compared with other products, the production cycle, logistics management and warehouse scheduling of agricultural tourism products are more complex, and their supply chain depends more on traditional channels than other products, which also means that the development of agricultural tourism product online retailers will face major challenges and pressures [13].

In 2015, online retailers enterprises have developed in China's rural areas, effectively connecting rural resources with urban demand information. By the end of December 2015, all major online retailers enterprises had accelerated their online retailers distribution in rural areas, and seized the opportunities of online retailers development in rural tourism, as shown in Table 1.

*Table 1: Layout of e-commerce enterprises in rural e-commerce*

| **online retailers enterprise** | **Rural online retailers layout** |
|---|---|
| **Alibaba** | **10,000 rural Taobao service stations have been built in 200 counties** |
| **Jingdong** | **600 county-level service centers, 1,100 JD service stations, 120,000 rural extension workers** |
| **Suning** | **1,000 Suning Tesco service stations** |
| **China Post** | **3,000 new village-level service points in Shaanxi** |
| **China Telecom** | **Carrying out a pilot project for the construction of village-level online retailers service points in Qinghai Province, cutting into the rural online retailers market from agency fee services** |

E-COMMERCEs for agricultural tourism products continue to emerge, and the competitive landscape is becoming more and more fierce. With the vigorous popularization of network technology, various E-COMMERCEs have emerged throughout the country. After more than ten years of development, the E-COMMERCE for agricultural tourism products has also been formed. In view of the competition pattern of "two supers-many strong-niche", "two supers" refers to two super-monopoly websites, including "Ali-based websites"-Taobao, Tmall "Miao Xiansheng", etc. "Jingdong website"-Jingdong Mall, etc., "Alibaba website" and "Jingdong website" together account for more than 80% of the total market share. "Duoqiang" refers to many highly competitive websites such as "Womai.com" and "Yihaodian". "Xiaozhong" refers to small websites with certain characteristics, such as "China Geographical Indication Product Mall", "Longbao Traceability Mall", "Tiantian Fruit Garden", etc. [14]. The continuous emergence of agricultural tourism products e-COMMERCE provides good opportunities and favorable help for the transformation and upgrading of China's agriculture. However, with the continuous increase of e-COMMERCE, the pressure on the production and sales of agricultural tourism products is also increasing: faced with many choices, consumers tend to be more selective and compare goods, which has a great impact on the quality and price of products. The requirements of platform services are higher and higher. If major businesses want to get a place in the fierce online retailers competition, they should make more efforts in product quality, service attitude and marketing strategy of production and sales [15]. The online retailers transaction mode of agricultural products is diversified, and the demand for talents is increasing. Most agricultural tourism product platforms are unable to make

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ends meet, so it is extremely urgent to integrate with big data. Tourism development lacks local characteristics, so it is difficult for E-COMMERCE to show its vitality.

### *2.2. Collaborative filtering algorithm*

Through the analysis and mining of user historical behavior characteristic data, the collaborative filtering algorithm uses the existing product evaluation information of users similar to the target user to perform similarity calculation and analogy reasoning, and effectively recommends items that may be of interest to the target user. Filter recommendation algorithms include user-based collaborative filtering algorithm (UserCF) and item-based collaborative filtering algorithm (ItemCF).

UserCF. The algorithm is based on the following principles: firstly, mine the user groups with high interest similarity with the target users, compare and analyze the items with high interest value in the similar user groups, but not found and purchased by the target users, and make personalized recommendation. As shown in Fig. 1.

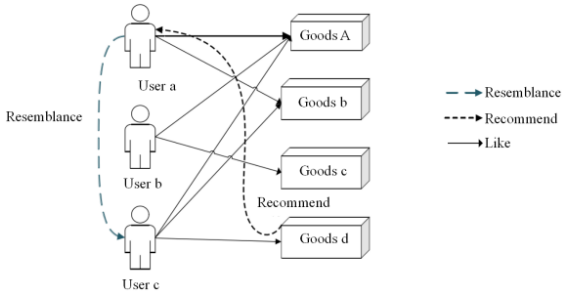


*Figure 1: Schematic diagram of user-based collaborative filtering algorithm*

After the similarity between users is obtained, the following formula is used to measure the $P_{ui}$ degree of interest of user U in item I, and the formula is shown in (1):

$$p(u,i) == \sum_{v} \in s(u,k) \cap N(i) w_{uv} r_{vi} \tag{1}$$

Among them, S(u,k) is to mine k similar users through the calculation of the interest of the target user u, N(i) is the user who likes the item i highly, $w_{uv}$ represents the similarity between users, and $r_{vi}$ is the hidden The feedback information represents the degree of user v's interest in the item i. In order to simplify the calculation, the $r_{vi} = 1$ can be used. After calculating $P_{ui}$ for all items, $P_{ui}$ can be processed in descending order, and the top N items are taken as recommendation results and displayed to user u (called Top-N recommendation).

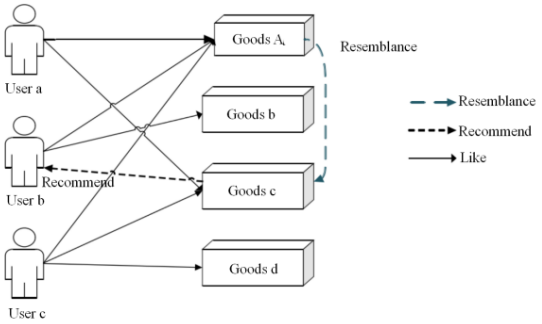


*Figure 2: Schematic diagram of item-based collaborative filtering*

ItemCF. The algorithm is based on the principle of recommending items with high similarity between users and their favorite items, and feeding back the top-N recommendation results to users. The behavior information of target users such as clicking, browsing, collecting, adding shopping cart, purchasing, scoring and evaluation on the sales platform is used for big data analysis, so as to mine the similar relationship between items and predict the favorite degree of target users. At present, this recommendation method can effectively avoid the cover up of popular goods on long tail goods, and

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accurately recommend items that are more in line with users' personalized preferences. The cold start problem of the recommendation system is further improved. While recommending items, it can well explain the recommendation reasons to users, as shown in Fig. 2.

Firstly, the algorithm calculates the similarity of articles by cosine similarity formula. Given articles I and J, let N (i) be the users who like articles I and N(j) be the users who like articles J. The cosine similarity formula is shown in (2):

$$w_{(i,j)} = \frac{|N(i) \cap N(j)|}{\sqrt{|N(i)||N(j)|}} \tag{2}$$

After obtaining the similarity, use the formula (3) to calculate the degree of interest, which indicates the relationship between user u and item i:

$$p_{(u,j)} = \sum_{i \in N(u) \cap S(j,k)} w_{ij} r_{ui} \tag{3}$$

Among them, S (j, k) is the collection of k items most similar to item k, n (u) is the collection of items liked by user u, $w_{ji}$ is the correlation between item i and item j, and $r_{ui}$ is the implicit feedback information. $r_{ui} = 1$ can be used to simplify the calculation. Because the algorithm has good performance in long tail item recommendation, real-time and cold start, it is suitable for the research of intelligent recommendation of agricultural products.

## 3. E-commerce platform construction of tourism agricultural products based on IOT technology under the background of big data.

### *3.1. E-COMMERCE*

At present, there is a phenomenon of high yield and low sales of agricultural tourism products in China every year, especially after the "twelve consecutive increases" in grain, and the "four highs" of high yield, high inventory, high cost and high import of grain in China. Every year, many agricultural tourism products are faced with the dilemma of selling at a loss or even being bought by no one. Therefore, strengthening the application of big data in the field of online retailers of agricultural tourism products in China can effectively solve this problem. Under the background of big data, this paper puts forward some suggestions on the construction of E-COMMERCE for agricultural tourism products in China. Each E-COMMERCE has its own characteristic customer data. If all major platforms want to take a share in the fierce competition, they need to effectively integrate and utilize these data resources to achieve flow to create maximum value. This is also true. It is the core content in the era of big data. Agricultural tourism products themselves have the problem of scattered cultivation, and most of them are fresh products, which require relatively high time requirements and need to update information frequently.

If the data is collected in the cultivated land and then updated through different equipment, it will inevitably require more time and energy to maintain the data update between equipment under complex operation. There are still some problems that the data is not accurate enough. The best way is to update it in time in the production place. Using iote commerce platform can simplify these complex operations. In the concrete improvement of E-COMMERCE, we should pay attention to tracing the source, and record data from the production of agricultural tourism products to the consumer information. Specifically, through the coordination and cooperation between the Ministry of Agriculture and china food and drug administration, efforts should be made to build a linkage mechanism between production permit and market access, speed up the construction of the national traceability information platform for the quality and safety of agricultural tourism products, and bring all green and pollution-free agricultural tourism products into the scope of quality traceability pilot, so as to gradually realize the traceability development of the production, preservation and sales chain of agricultural tourism products from point to area.

It is recommended to establish a comprehensive service station for rural online retailers in the administrative village, as shown in Fig. 3. Integrate standardized product provision, rural small and micro financial services, rural online retailers training, online marketing and other platform functions to provide rural and urban residents with diversified services such as electronic shopping malls, agricultural

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information, agricultural technology, distance education, expert online, policies and regulations. The service station is also the center of comprehensive resources such as medical care, finance, employment, and online retailers. At the same time, comprehensive service centers will be set up in towns and counties to create a service system with a trinity of counties, towns and villages.

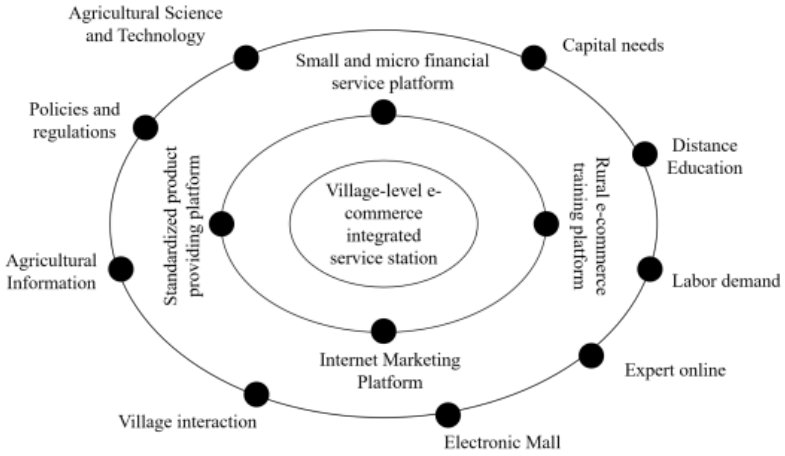


*Figure 3: Village-level online retailers integrated service station*

It is suggested to focus on the construction of online retailers supply bases for rural tourism reception, agricultural products, vegetables and fruits. Fully implement standardized services in the supply base, as shown in Fig. 4. Promote modern production modes such as organic fruits and vegetables, grain and oil planting. We will accelerate the formulation of technical standards for agricultural production and fully implement standardized production. Comprehensively promote the certification of pollution-free, green and organic agricultural products, strengthen the construction of agricultural product quality monitoring system, and strive to realize the whole process traceability of online retailers services and products.

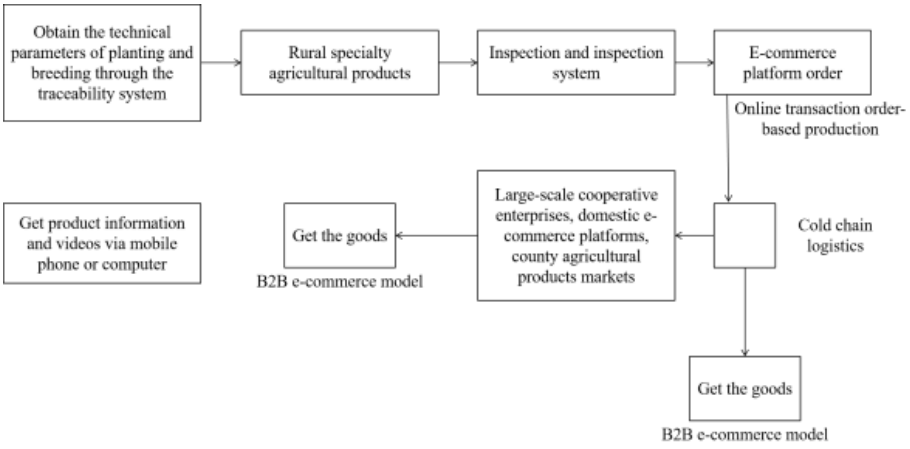


*Figure 4: A platform for providing standardized products that can be traced throughout the entire process*

### *3.2. Deep penetration of the concept of environmental protection*

Today, with the concept of "green economy" and "sustainable development" gradually gaining popularity among the people, most tourists have a more rational understanding of the tourism environment. In the process of production and development of agricultural tourism products, we should focus on the concept of health and environmental protection, focus on the construction of green food, organic food and pollution-free bases, persist in cultivating ecological recycling agriculture industry, build characteristic ecological agriculture demonstration zones, vigorously promote green models, green technology and green technology, promote ecological planting and enhance the benefits of agricultural tourism products. In addition, the E-COMMERCE for agricultural tourism products should also focus on green environmental protection, focusing on product packaging and poster promotion to reflect green and pollution-free, and grasp the topics that consumers care about. Strengthen the construction of the

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agricultural product quality monitoring system, and strive to achieve the full traceability of online retailers services and products.

## 4. Conclusions

In the face of the commodity data updated at any time in the e-COMMERCE of agricultural products and a large amount of user information, the contradiction between the circulation of agricultural products market is becoming increasingly prominent. The original artificial intelligence and data mining technology cannot meet the storage and analysis needs of effective information data in the e-COMMERCE of agricultural products. Nowadays, the varieties, packaging and sales channels of agricultural products are becoming more and more diversified. In the context of IOT, there are great opportunities for the development of tourism agricultural products. Online retailers of tourism agricultural products is a new platform for tourism. At present, many county and town tourism agricultural products are looking for the development path in the IOT era, and actively building an online retailers system platform. On the basis of IOT technology, actively docking tourism agricultural products resources is an effective way to help tourism agricultural products go out of the countryside and develop rural economy. The emergence of IOT will inevitably promote the rapid development of online retailers. IOT technology brings a revolution and an opportunity to the logistics industry and online retailers. Building an E-COMMERCE for tourism agricultural products based on IOT technology in the context of big data is of great significance for promoting the development of online retailers. Based on the in-depth analysis of the current domestic rural online retailers, combined with the characteristics of tourist agricultural products, this paper innovatively proposes to construct an online retailers system for tourist agricultural products and also proposes safeguard measures for the development of tourist agricultural products under the background of IOT, which is helpful to the development of tourist agricultural products. The E-COMMERCE system for tourism agricultural products envisaged in this article has not solicited opinions and suggestions from experts in related fields, and needs to be further improved and improved.

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