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## HOW TO HELP RAISE THE STATUS OF AGRICULTURAL OPERATORS IN THE AGRICULTURAL VALUE CHAIN: DESIGN OF A ONE-STOP AGRICULTURAL SERVICE PLATFORM

**Abstract:** According to the NO.1 Central document in 2019, China's agricultural economy has entered a critical period of improving quality and efficiency, and we should consolidate the sound momentum for agricultural and rural development, capitalizing on the role of agriculture, rural areas and rural people as the ballast stone. And therefore, work must be done to deepen agricultural supply-side structural reform in this decisive period for completing the building of a moderately prosperous society in all respects. This paper analyzes several problems in the process of the development of agricultural production and agricultural e-commerce. And through studying, our company decide to design a one-stop platform combining the big data, cloud computing and agricultural Internet of things, in order to help agricultural operators, solve the capital problem and raise the status in this era of rapid development of the Internet. With the BAF platform, the information about supplying and demanding can be shared. And apparently, the inter-connection of the platform's function can help safeguard the users' economic interests and is beneficial to optimize the agricultural supply chain.

**Key words:** agricultural e-commerce, agricultural supply-side structural reform, agricultural supply chain.

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### Introduction

Agriculture is the foundation of our national economy. The rapid development of mobile Internet and the continuous development and application of 5G technology make agricultural e-commerce become the booster of China's agricultural economic development and also bring new opportunities for the development of agricultural e-commerce in China. From 2014 to 2019, the NO.1 document of the central government mentioned the development of rural e-commerce for six consecutive years, stressing the need to build modern agricultural products sales and public service platforms, implement the digital rural revitalization strategy and develop a new Internet agricultural industry model to help farmers increase output and income. And then, rural modernization can be accelerated.

China's current agricultural e-commerce development is still in a single development stage, mainly based on agricultural e-commerce platforms such as fresh e-commerce platforms. But the proliferation of such platforms has only partly facilitated consumers and agricultural operators, the non-standard follow-up of the standardization of agricultural products, the imperfect control of the e-commerce platform and the fragmentation of the operation of the agricultural supply chain cause the income of agricultural operators to still be less, and the food safety of consumers is not guaranteed on some platforms. In addition, in the current development process of the agricultural economy, the characteristics of the agricultural financial cycle, long-term seasonality and high risks make its development degree lag behind. As a result, the operation of the agricultural supply chain cannot be carried out smoothly. Fragmentation of agricultural supply chain also makes the phenomenon of low-end agricultural value chain more serious, which makes the optimal allocation of agricultural resources difficult. In the agricultural supply chain, the production link is its weakest link. The agricultural operators have insufficient economic strength—the credit is low, the loan amount is small and scattered, and the lack of mortgage guarantees and other problems lead to financing difficulties. For financial institutions such as commercial banks, in the face of these agricultural operators with weak potentials and severely uneven cost-benefits, they chose to give up this market with the goal of making profits. So, in the current environment, it is extremely urgent to improve the status of agricultural operators, building a perfect

credit rating system for them and creating a good financing environment.

In recent years, along with the rapid development of the Internet industry, many domestic and foreign scholars have focused on the dimension of 'Internet platform to promote the development of agricultural production'. Their focus is mainly on the operation mode, system construction and case analysis of the agricultural product e-commerce platform. For example, Liu and Mcfarlane<sup>[5]</sup> respectively analyzed the cases of agricultural product e-commerce development in Japan and the United States, and believed that the cooperation model of government, agricultural economic cooperation organization and third-party logistics company is conducive to the rapid development of agricultural products e-commerce; domestic scholar Luo Yi's<sup>[7]</sup> research is based on the 'house platform' in Shanghai and the 'Freshdirect' platform in New York, which suggested that the development of domestic agricultural products e-commerce platform should focus on 'improving farmers' economic interests and serving consumers'; Wang Ke<sup>[4]</sup> was quantitatively analyzing the agricultural product supply chain channels; Wen-Jie C<sup>[10]</sup> proposed different opinions and suggestions on the development path of agricultural products e-commerce from different dimensions and different regions.

Compared with developed countries such as the United States and Britain, Japan and China are encountered the common problem of the asymmetry of land and population on the road of agricultural development. In terms of the development of agricultural e-commerce, Japan vigorously promotes brand effects, such as 'nearly 800 houses'. The brand feature of the website is to sign contracts directly with producers to purchase goods from the source to ensure the freshness and safety of agricultural products to the greatest extent. The price of the product has also been reduced, and such brand effect is widely favored by the public. It is also because of such direct product and brand promotion that made the annual sales of Japanese agricultural products e-commerce increase from US\$6.1 million in 2005 to US\$25 million in 2015, a 3.1-fold rise in 10 years. In terms of agricultural finance, Japan is a small country with a small agricultural economy. The agricultural financial system adopts a cooperative type and is highly government-oriented. It includes three levels: policy financial institutions, cooperative

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financial systems and agricultural insurance institutions. Such a "2+1" cooperative support model and Japan's strong legal system ensure the stable development of agricultural finance.

In summary, scholars' research on agricultural e-commerce has mostly focused on agricultural products e-commerce in recent years. From the construction of logistics transportation system, the supply chain structure of agricultural products to the brand building of agricultural products and e-commerce, the regional development of 'point-to-face', all having made detailed case studies and qualitative and quantitative studies. However, the research on the overall agricultural e-commerce is relatively small, and there is a lack of research on the construction of the credit system of agricultural operators, the quality and safety traceability system of agricultural products and innovative practice of multi-role interconnection of government, e-commerce platform, agricultural operators and consumers. So, this paper is based on the BAF one-stop agricultural service platform developed by BAF Science and Technology Service Company, conducting an in-depth analysis of the innovative development and integration of agricultural e-commerce platform, and providing reference for the development of agricultural e-commerce in China. From the perspective of improving the quality and efficiency of the agricultural supply system, promote the upgrading of the agricultural industry, enhancing the position of agricultural operators in the smile curve, innovating and optimizing the agricultural credit, using the Internet platform to guide small farmers to transform into new agricultural operators, strengthening the dynamic adaptation of medium and high-end agricultural demand and deepening the structural reform of the supply side of agriculture.

## II. Materials

### 2.1 The definition of agricultural e-commerce and the development of related platforms.

The agricultural e-commerce platform is a comprehensive e-commerce platform that combines e-commerce in rural areas, urban agricultural e-commerce, urban agricultural products supermarkets and retail stores to integrate the main body of the agricultural product supply chain and match more accurate supply and demand information. Furthermore, it is conducive to consumers and relevant regulatory authorities to supervise from the source of agricultural suppliers to ensure the quality of agricultural products. In addition, the addition of urban agricultural e-commerce satisfies the individualized needs of consumers at different levels, attracting consumers to purchase agricultural products through the methods of leisure agriculture such mining, sightseeing and tourism, thus realizing the flow of information in the supply and demand of

agricultural products, logistics and capital flows are connected by the shortest path. At present, China's e-commerce platform is not comprehensive enough, mainly divided into agricultural products e-commerce, agricultural e-commerce and rural e-commerce.

Among them, the faster development is the agricultural products e-commerce, that is, the agricultural products e-commerce platform that focuses on the sales and distribution of agricultural products, instantly connecting suppliers and consumers, especially the e-commerce platform featuring direct production and direct supply of agricultural products. For example, ShiXun.com, which was launched in June 2015, is a vertical e-commerce platform for fresh ingredients based on the physical wholesale market. In addition, the momentum of fresh e-commerce is also particularly rapid, For example, fresh food e-commerce based on online retail and supported by high-traffic online shopping platform like Jindong fresh food, Yihaodian and so on. According to statistics, from 2012 to 2016, the transaction volume of China's fresh e-commerce market has soared from 4 billion yuan to 95 billion yuan.

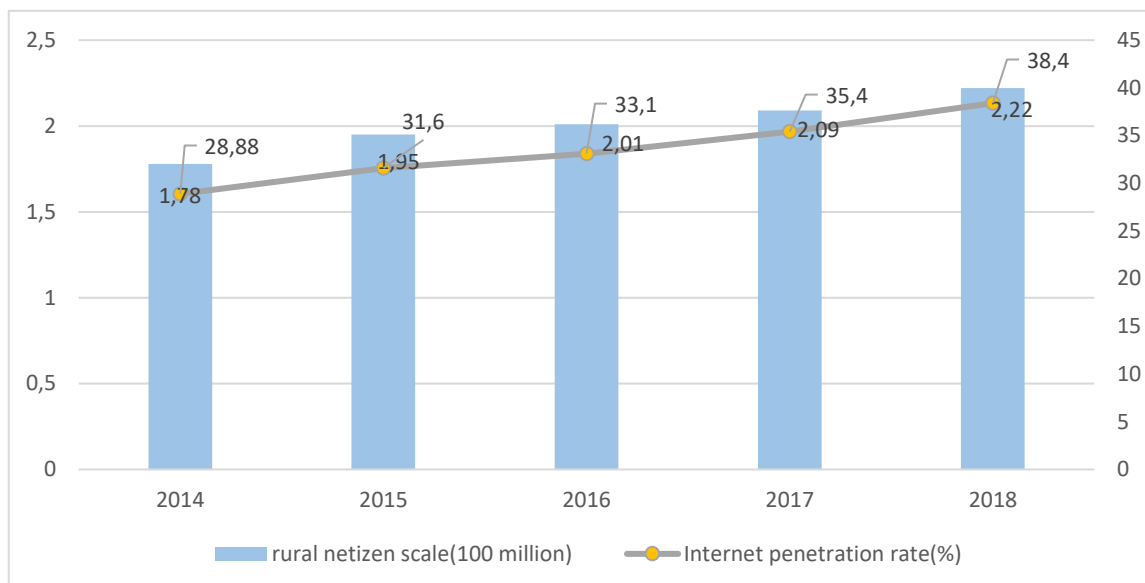
### 2.2 Market feasibility analysis

As is shown in the Figure 1, the scale of rural Internet users has been expanding. The number grew from 178 million people in 2014 to 2.22 million people in 2018. And the Internet penetration has arrived 38.4% in 2018. Although the Internet users in rural areas account for less than 30 percent of the country's Internet users, thanks to a huge rural population and policy dividends, the development potential and prospect of rural e-commerce are still very broad. At the same time, it is obvious that the agricultural operators in China are adapting to the Internet age, and they are learning to increase their income through using the Internet. This situation provides amounts of opportunities for the development of agricultural e-commerce.

According to the information, in 2018, the national rural network retail sales reached 1.37 trillion yuan, a year-on-year increase of 30.4%; the national agricultural product network retail sales reached 230.5 billion yuan, an increase of 33.8%. It can be seen that in recent years, China's rural e-commerce has developed rapidly and played an increasingly important role in the road of rural revitalization. In terms of e-commerce development, e-commerce in the eastern region has developed rapidly in terms of regions. According to the data, online retail sales in the eastern region accounted for 77.3% of the country's overall online retail sales in 2018, an increase of 29.1% year-on-year. Secondly, online retail sales in the central region accounted for 13.6% of the country's overall online retail sales.

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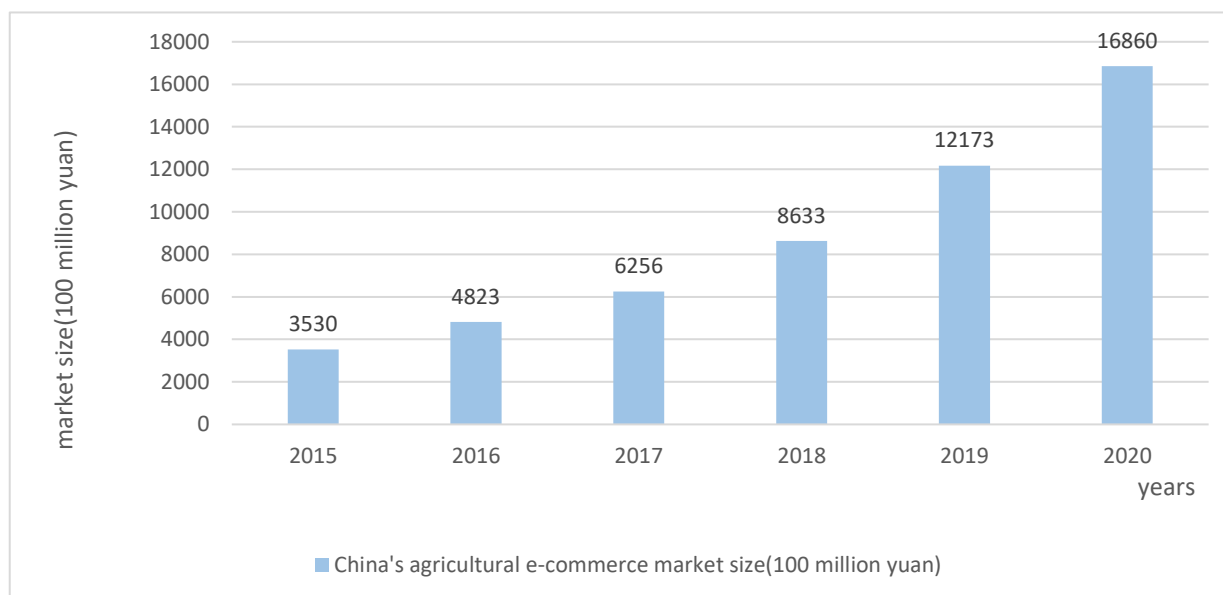
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**Figure 1- The scale of Internet users in rural areas and the Internet penetration in 2014-2018**

With the rapid development of the Internet and the arrival of the 5G era, the advantages of agricultural e-commerce have become more prominent, and the scale of agricultural e-commerce is gradually expanding. As is shown in the Figure-2, it is expected

that the scale of China's agricultural e-commerce will exceed 1.2 trillion yuan by the end of 2019. The scale of China's agricultural e-commerce will exceed 1.6 trillion yuan.



**Figure 2-The scale of Chinese agricultural e-commerce market**

Through the data from the table 1, the gap between the rural deposit balance and agricultural loans has gradually increased in 2005-2017. The rural deposit fund is high, the demand of rural credit loan is large. However, capital is not lending enough to meet agricultural operators' demand. Thus, the financing difficulties are the main problem in the process of agricultural production. And this problem has increasingly becoming an obstacle through the

development process in recent years. There are two reasons of the problem: the first is the number of farmers' demand of capital is small, and lacking of collateral makes security difficult. The second is the uncertainty of agricultural risks, and the Interest rates on farm loans are high. However, the average return on investment in agricultural area is not high. This also increases the financing cost of agricultural operator indirectly.

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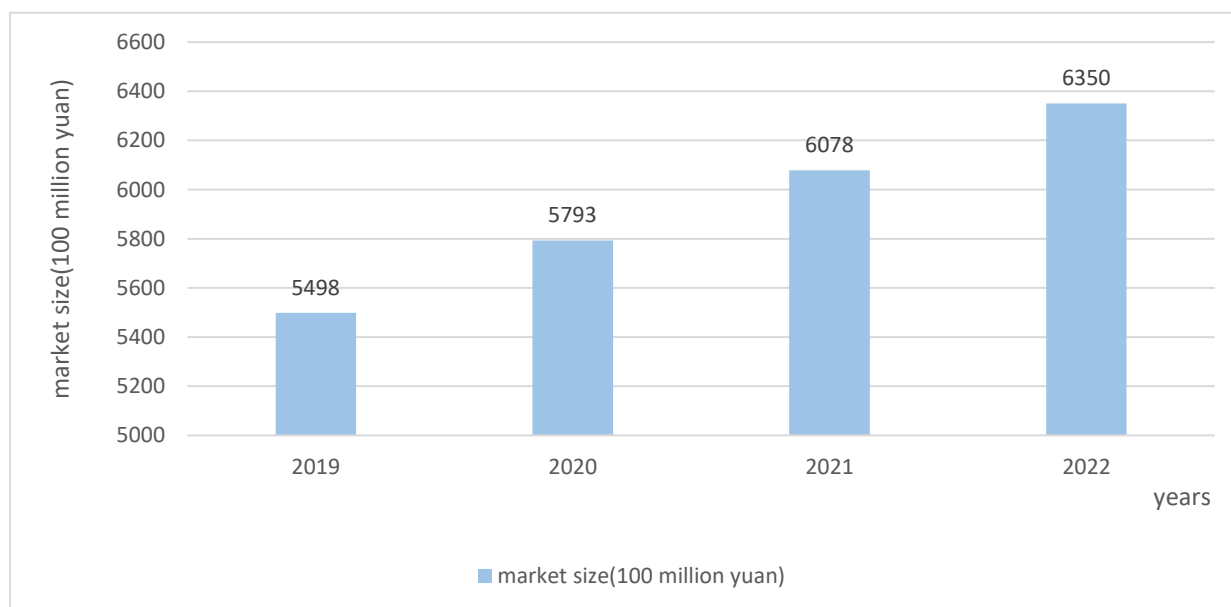
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**Table 1. China’s rural financial capital development status in 2005-2017**

Year	Rural deposit balance (100 million yuan)	Rural loan balance (100 million yuan)	Total rural financial capital (100 million yuan)	The number of rural commercial bank	The asset scale of rural commercial banks (100 million yuan)
2005	24606.37	11098.22	35704.59	6	3872.15
2006	28805.12	12704.75	41509.87	13	5534.29
2007	33050.26	14833.10	47883.36	17	6936.83
2008	41878.69	17065.28	58943.97	22	9291.55
2009	49277.61	19778.66	69056.27	43	18661.96
2010	59080.35	23043.70	82124.05	85	27670.20
2011	70672.85	24436.00	95108.85	212	42527.18
2012	85335.12	27261.00	112596.12	337	62751.73
2013	101268.71	30437.00	131705.71	468	85218.59
2014	120646.63	33394.00	154040.63	665	120610.27
2015	142835.48	35137.00	177972.48	859	152300.63
2016	165927.05	36627.00	202554.05	1055	201988.72
2017	191538.74	38898.00	230436.74	1351	247498.85

With the rapid development of China’s economy and gradual improvement of people’s living standards, consumers’ requirement of agricultural production’s quality is higher and higher. Under the condition that adequate food and clothing needs are satisfied, people pay more attention to the reasonable combination of dietary structure and the safety and nutrition of food. According to the

Consumer Protection Association, food safety has always been a major problem reflected by consumers. We can know from the Figure 3 that the complaint rate of food safety is as high as 68 percent. At the same time, green and pollution-free natural agricultural products have begun to win widespread favor of consumers. It is estimated that in 2021, China’s green food market will exceed 600 billion yuan, reaching 607.8 billion yuan.



**Figure 3-The forecast of green food market size**



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### 2.3 The current situation of agricultural e-commerce in China

(1)Scale operation has not yet formed a general trend: The small scale of agricultural production in some areas and the dispersal of land have hindered the improvement of agricultural productivity and hindered the development of mechanization of production, which is not conducive to unified seed supply, mechanized operations, irrigation, fertilization, pest control and new material agriculture. Science and technology have virtually increased production costs, and the quality and safety of agricultural products are not effectively protected. Even in some places, scattered agricultural production has seriously affected labor productivity, but due to land dispersion, mechanized production cannot be smoothly carried out, and existing agricultural infrastructure cannot meet the needs of agricultural production.

(2)The rural financial system is not yet perfect: Agricultural production is greatly affected by natural factors, and there are many uncertain factors in the production process. However, China's agricultural production guarantee mechanism is still not perfect, which greatly affects farmers' production enthusiasm. What is more noteworthy is that the development of rural finance has been stuck in the policy-based financial stage for a long time. The problems of service coverage, supply scale and insufficient service quality have become prominent, which has caused many farmers to face problems such as "funding difficulties, expensive financing and difficult guarantees".

(3)Serious homogenization of agricultural products: Most of the more popular agricultural products on the current large-flow e-commerce platform are products with higher standardization, but among these products, the types are similar, lack of product innovation, and the innovation of agricultural products is poor, which is not conducive to e-commerce's further development of advantages. At the same time, this large-scale non-differentiation model and uncharacteristic brands make it difficult for these e-commerce platforms to form a fixed core customer base by establishing a brand image, and it is more difficult to increase the added value of products, which may eventually lead to bad competition among peers and reduce economic efficiency.(Cheng Chen and Ding Dong 2016)

(4)Logistics and transportation system needs to be strengthened: The risk of agricultural e-commerce

is not only in the production of agricultural products. In the process of transportation of products, the loss of product quality will inevitably increase the production cost and impair the economic interests of farmers.

In general, the problems faced by farmers at present are not only the sales of agricultural products on the e-commerce platform, but also the initial stage of e-commerce. In the future, what farmers will lack are financial financing support, timely delivery of market information, personal enterprise credit enhancement, value chain industry linkage, product image creation, product value-added and other aspects of agricultural production needs.

### III. The design and implementation of BAF platform.

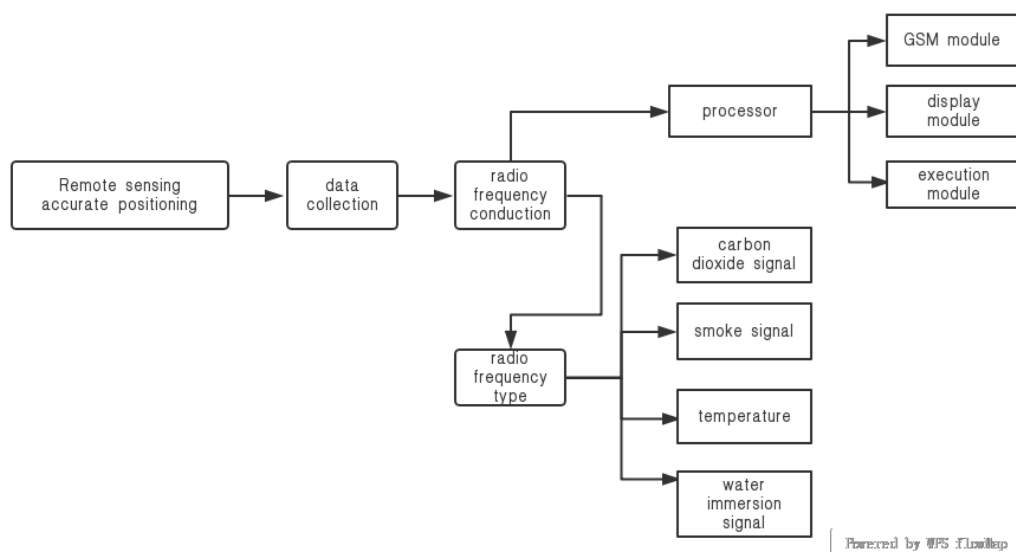
#### 3.1 technologies application

##### 3.1.1Intelligent Control System for Greenhouse

A fusion system of the Internet of Things and modern sensor information technology-- precisely locates crops by sensors, satellite positioning and RFID, collecting crop information and upload relevant information to the Internet for analysis and calculation. According to the technical characteristics of the Internet of Things, the control system can be divided into perception layer, transmission layer and application layer. In the perception layer, soil moisture, greenhouse temperature, carbon dioxide concentration, crop growth and other information are collected through satellite positioning, remote sensing technology, etc., and then these information will be digitized and transmitted to the agricultural equipment terminal, mobile terminal and application layer background with the help of the Internet and local area network of the transmission layer for real-time display. The application layer is the top link of the entire intelligent control system, through which agricultural operators can control greenhouse dynamics via platform operation in real time. For instance, control the photosynthetic temperature of greenhouse crops in 20-25°C, control the respiration temperature in 36-40°C and the carbon dioxide concentration at about 0.1%. Meanwhile, GSM module intelligent alarm system will be added into the intelligent control system to minimize some loss caused by natural or human factors. Such an intelligent greenhouse system based on Internet of Things technology can make agricultural production more efficient and intensive.

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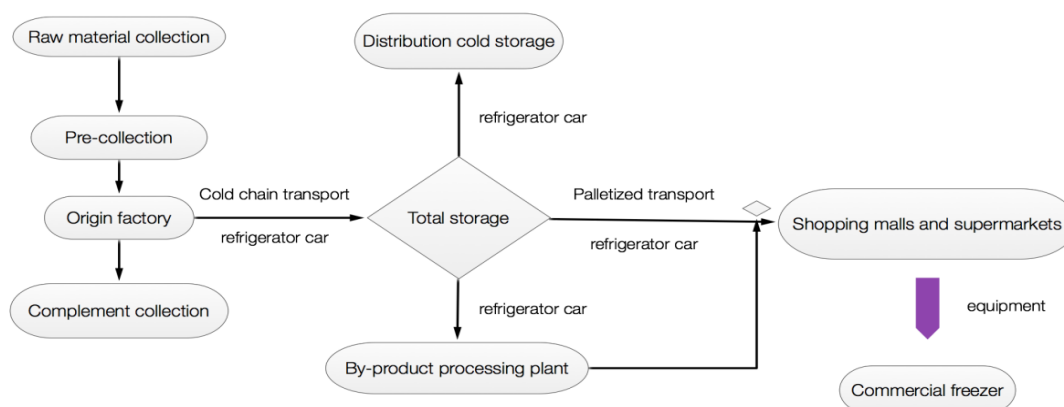


Picture 1-Control Paths of Intelligent Greenhouse

### 3.1.2 Cold chain logistics transport technology

Cold chain logistics transport technology is mainly divided into three links: raw material acquisition, circulation system and market control. Each link has certain operation process and transportation track. Furthermore, in the transport process, for medium and high-end products, using ecological cling film and chemical preservative packaging, for the low price of agricultural products, taking corrugated film bag and put into hard silicon window installation, keeping good air permeability. In

the palletization transportation in the process of distribution, optimizing the lightening process, trying to mechanize craft process, shortening the loading and unloading and stacking time; Strictly implement the product traceability mechanism to ensure the high efficiency of the cold chain logistics process. In terms of specific operation, digitize, intensify and mechanize the agricultural products. Attach the QR code to each box of products for the convenience of the inspection and supervision in the transportation process.



Picture 2-Cold Chain Transport Process

### 3.2 The implementation of BAF platform

Based on the above materials analysis and technologies application, our company has created a one-stop platform called Beneficial to all farmers(BAF) .BAF's technical basis is big data, cloud computing and application of agricultural

Internet of things' has two entrances: one is for agricultural operators, and the other is for amounts of consumers. The divided entrance can help us better manage and operate the platform.

For agricultural operators, we can provide optimal choosing functions of agricultural materials

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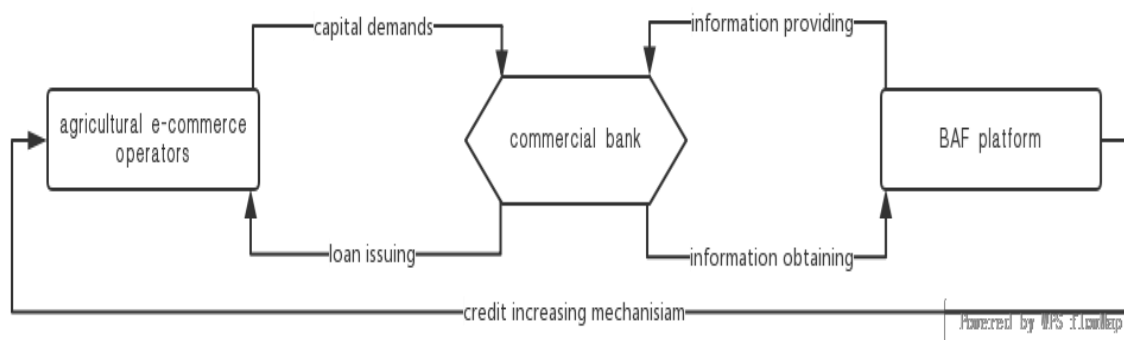
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and agricultural productive services, modern management of agricultural production, including the application of agricultural Internet of things, the function of agricultural operators' credit rating, policy guidance from government and expert technical guidance. For consumers, it is beneficial for them to trace agricultural products, and through BAF, they can learn about the whole process of producing and selling agricultural products. If they want to deeply understand the planting and picking process of crops, they can go to the place that plants crops and experience this process.

### 3.3 The innovative advantage of BAF platform

#### 3.3.1 Featured financial services

It is worth mentioning that the function of agricultural operators' credit rating. As is shown in the interface, the agricultural operators can query their credit values, and then they can increase their credit values through binding Alipay, We chat to BAF. Also, the transaction records and consumers' appraisals will be used as the criteria of credit values. The higher the credit value is, the easier they get the loan. In BAF's mechanism, BAF is a platform that can help some financial institutions, like commercial bank obtain the agricultural operators' information about finance and credit. At the same time, farmers can get the capital through BAF's help from commercial bank. And the bank doesn't have to worry about the unsecured capital. In addition, farmers can purchase some financial products and innovative agricultural insurance through BAF.



Picture 3-Financial Service System

#### 3.3.2 The selection of agricultural materials

Another innovative function is gathering numerous agricultural operators together and choosing better agricultural material suppliers through price comparison and service evaluation. When the agricultural operators have autonomous choices, the status of agricultural operators in the smiling curve can be improved. In the process of platform operation and promotion, we will encourage some agricultural production service suppliers to join in, and expand the space of sales for them. The win-win situation between agricultural materials suppliers and agricultural operators will be expected.

#### 3.3.3 Tracing productions' sources

For consumers, they can not only learn about the route of logistic, but also know where the agricultural production comes from and which agricultural materials do farmers use in the process of planting. Such a transparent production process can guarantee the quality of products apparently. The whole-process cold chain logistics technology also reduces the quality loss of agricultural products in the

transportation process and effectively reduces the production cost. When the products are very popular, they can purchase these products by making an appointment.

These three main advantages on the BAF platform are dependent mutually. The supply of agricultural materials and the optimization of agricultural productive services provide a large number of trading subjects for BAF platform. On the one hand, the application of big data and the agricultural Internet of things extends and expands the supply of agricultural materials, on the other hand, it also provides data sources for the credit enhancement of agricultural operators and establishment of trace system. For government, massive amounts of information analyzed by using big data can help optimize relevant policies and promote the development of agriculture accurately.

## IV. Discussion

In the initial stage of platform construction, the company will be in Hefei, Anhui Province as a pilot, to radiation to the surrounding areas of the way to



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develop, the main user groups for agricultural suppliers in agricultural developed areas, agricultural service providers, agricultural operators, urban agricultural retailers and agricultural consumers. Among them, agricultural suppliers, agricultural production service providers, agricultural operators, urban agricultural retailers can have access to their own credit rating system through the introduction of identity information, transaction flow and other information flow integration, and through the platform to commercial banks and other major financial institutions to apply for microcredit as well as easing the pressure on capital.

For agricultural products consumers, they can not only directly purchase, book high-quality, green, safe agricultural products on the platform, but also book some agricultural picking garden and farm experience projects, these projects are also conducive to the development of tourism economy in surrounding townships, for the improvement of agricultural value chain to provide an opportunity. However, compared with the existing agricultural e-commerce platform in the market, Huiwan agricultural platform still has some defects in the brand building and the improvement of the added value of products. In 2009 online operation, "cook butler", based on the Shanghai agricultural market e-commerce platform, in addition to operating a variety of fresh fruit, meat and poultry eggs and milk, it also makes use of some special group purchase packages, gift cards, fruit and vegetable gift boxes, farm music and other forms to create a "food butler" unique brand effect, enhancing the added value of products. Due to the small size of the region and the "point-to-point" cooperation between the platform and cooperatives, agricultural enterprises and farmers, supply and demand information can be more timely docking, and the quality and price of agricultural products can be more efficiently guaranteed. For the Huiwan agricultural platform, in the early stage of platform

construction, our main goal is to build a bridge between agricultural suppliers and agricultural operators, and strive to build the platform for agricultural production service providers of the preferred function, improving the position of agricultural operators in the smile curve so as to protect the quality of agricultural products from the source.

In this way, the added value of products may not be effectively improved for the platform, which is not conducive to the brand promotion of the platform in a short time. In addition, the arrival of the 5G era makes 5G Internet and agricultural e-commerce an opportunity, but in the consumer's live experience function, the world's AR technology chip temporarily does not support 5G port access, that is, the addition of 5G may not make its advantages of large bandwidth play. The user's visual sands and story experience may not be optimized.

Therefore, in the rising period of the platform, how to use technological advantages to seize more market share is also a problem in platform development in addition to giving agricultural operators credit promotion, credit guarantee opportunities.

## V. Conclusion

BAF is an one-stop platform based on the big data and agricultural Internet of things mainly for agricultural operators, given attention to amounts of consumers. We expect the problem of capital can be solved by establishing credit rating system, and the next step is to increase the farmers' income. In addition, joining of agricultural materials suppliers and the agricultural productive service suppliers will optimize the agricultural supply chain of BAF platform and improve the status of agricultural operators.

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