Paths for Upgrade and Transformation of E-commerce of China’s Fresh Agricultural Products Based on Whole Industry Supply Chain

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Abstract China’s e-commerce market scale of fresh agricultural products has reached 1000 billion yuan, and the prospect is bright. However, in the face of such problems as quality control, storage and distribution, and consumption habits, the fresh product e-commerce has great difficulty in development. Internet generates large data, and data are the resources and the core of the Internet and the foundation for survival and development of Internet. This paper analyzed the current situation of the development of fresh agricultural products, and discussed the plight of fresh product e-commerce in scale, profit, non-standard, and network environment. On the basis of the whole industry supply chain, it came up with paths for upgrade and transformation of the fresh product e-commerce with the big data as the core in the context of Internet environment.

Key words Internet, Fresh agricultural products, E-commerce, Big data

1 Introduction

The reform of agricultural products, with fresh product e-commerce as representative, has become an important starting point for the innovation and development of Internet + agriculture. This fully conforms to the connotation of structural reform of agricultural supply front. In 2017, the central document No. 1 focused on the structural reform of the agricultural supply front, and proposed strengthening the construction of cold chain logistics infrastructure network such as pre-cooling of agricultural products, improving the direct supply and sales system of fresh agricultural products, and promoting the "Internet +" modern agriculture. The Ministry of Commerce and the State Council issued the "Internet + Circulation" Action Plan and the Circular on the Issuance of the Action Plan on Promoting the Development of Big Data Industry accelerated the deployment of big data. Deepening the application of big data has become an essential necessity and inevitable choice for stabilizing the growth, promoting the reform, regulating the structure, benefiting the livelihood, and promoting modernization of government administration. The rapid development of the Internet generates large volume of data, and its huge database is the key to the development of modern information technology. The application of big data in the circulation field is an inevitable trend for agricultural products. Thus, it is expected to promote development of e-commerce of agricultural products, help to solve the three rural issues, exploit agricultural market, and develop rural economy through accelerating e-commerce logistics of agricultural products and establishing a new circulation mode on the basis of big data.

2 Current situations of development of e-commerce of fresh agricultural products in China

Apart from staple food, Fresh agricultural products are main source of nutritional foods for consumers, and generally refer to agricultural products with high moisture content, short preservation period, and easy perishable nature. E-commerce of fresh agricultural products refers to the transaction of fresh agricultural products on the Internet platform, such as directly delivering fresh agricultural products to consumers through self-built logistics or third-party logistics. At present, the offline retail of fresh products is still the mainstream. The online retail of fresh products starts late and only accounts for 3% of channel sales, but the growth momentum is strong, and e-commerce of fresh agricultural products is standing in the face of the storm of Internet capital, policy, and consumption upgrade. With the upgrade of related technologies and introduction of capital, China’s e-commerce market of fresh agricultural products remains in the period of rapid development, the market performance is excellent, and the transaction size increased from 420 million yuan in 2010 to 91390 million yuan in 2016, increasing by 68.6%. However, the fact is that the entire e-commerce platform of agricultural products suffers tremendous losses. How to get out of such dilemma is an important project for e-commerce operators.

3 Development difficulties

3.1 Size restriction

3.1.1 Many e-commerce operators are small in size and their profit is low. According to estimation of Alibaba Research Center, the number of online stores operating agricultural products was 260600 in 2012, and it rose to 900000 in 2015, showing multiple growth. However, only 20 e-commerce platforms have higher profit, accounting for 1% ; 4% platforms barely broke even, and 95% suffered losses, and 7% suffered huge losses. Most plat-
forms adopt family-style small size operation mode\(^7\), their store level is relatively low, operation and management ability is limited, resource sharing is difficult, the logistic delivery is weak, products are simple, and the platform is small.

### 3.1.2 The front-end procurement size of e-commerce supply chain is small

The production of fresh agricultural products in China is generally "individual family or household" small peasant production. The production is scattered, and agricultural products are seasonal and regional, which increases the front-end logistics costs of e-commerce operators. Due to the low degree of standardization of goods, e-commerce enterprises are mostly non-agricultural enterprises. They pay little attention to the front-end procurement, most adopt targeted procurement bases, and have no strategic cooperation thinking. Most fresh agricultural products remain at the stage of dumping of raw materials. It is impossible to carry out systematic packaging and marketing, impossible to satisfy large scale market of e-commerce, and there is frequent occurrence of non-seasonal out of goods.

### 3.1.3 End consumer groups are small

According to the BCG Report on China Consumer Trends, with people born in the 1980s and 1990s becoming main consumption forces, the penetration rate of fresh product e-commerce will have a certain degree of rise. At present, online shopping groups of fresh agricultural products still remain at a relatively small stage. The main force mainly comes from tall, rich and handsome people who have money but no leisure time and have online shopping habit. They have relatively high income, so they care little about the price difference between online and offline shops. Besides, fresh product e-commerce is different from other products, perishable and vulnerable nature makes most consumers lack confidence and sense of security. For those middle-aged people who follow the principle of "seeing is believing", online shopping of fresh products is not their optimal choice. Small consumer group and limited consumption scale will bring small e-commerce flow and high costs and insurance.

### 3.2 Profit restriction

#### 3.2.1 High cost is the biggest challenge for fresh product e-commerce operators

The perishability of fresh products determines that the logistics must be whole-process cold chain, including core links such as storage, transportation, and distribution, but cold chain facilities, cold chain technology, cold chain management will bring high cost logistics. According to the statistical data of 2015, the logistics and distribution costs of clothes and electronic products take up only 5% in the entire circulation process, while that of fresh agricultural products accounts for 25% – 40%\(^8\). According to estimation of the logistics industry, if the unit price of fresh agricultural product e-commerce is 100 yuan, 20 – 40 yuan will be logistics cost, which is 5 yuan more than other daily necessities.

#### 3.2.2 Low added value is the internal injury of fresh product e-commerce operators

Through a general overview of survived e-commerce operators, in the conspicuous position of shopping page, there are aristocratic products such as salmon from Norway, red shrimps from Argentina, and *Paralithodes camtschatica*. Imported food with high premium accounts a large portion. Fresh fruits and vegetables have low added value, the profit is not enough to cover the cost. Simply buying the fresh vegetable or fruit, it is seldom to exceed 200 yuan for a single order. According to the data estimation, if the price of fresh agricultural product per single order is lower than the 200 yuan, the e-commerce operator will suffer losses.

### 3.3 Restriction of non-standardization of products and logistics

#### 3.3.1 Classification and grading standardization degree of agricultural products is low

Due to the wide variety and long production and sales chain of agricultural products, the sensory quality standard is difficult to define, such as cherry, sour, sweet, soft or hard nature can not be seen in the electronic order. E-commerce is invisible transaction of goods, non-standard attribute will lead to the lack of trust and will lose the customer base.

#### 3.3.2 Nonstandard attribute of logistics service makes it difficult to guarantee the fresh quality in circulation

Taking fresh vegetable and fruit as an example, in the process of growth and harvesting, due to influence of many factors, such as size, shape, color, maturity, pest damage, and mechanical damage, conditions necessary for housing and delivery are naturally different. Taking warehousing temperature as an indicator, sweet orange 1 – 3 °C, and Guangdong banana 11 – 13 °C, different fresh products should be provided with different cold chain service standards. The lack of logistics service standards leads to dissatisfaction of users with the quality of the products. As a result, there will be many returns of goods and loss of customers.

### 3.4 Front-end network environment of fresh product e-commerce operators is not mature

Due to the farmers themselves and environmental conditions, the front-end e-commerce network environment is not mature for supply of agricultural products. According to data issued by the China Internet Network Information Center (CNNIC) in the 39th time, by December 2016, non-netizens reached 642 million, and 60% of them came from rural areas\(^9\). The process of urbanization, to a certain extent, covers up the advance of Internet in rural areas, the lack of Internet skills and low cultural level are the main factors hindering rural residents surfing the Net. In rural residents who surf the Net, real farmers only accounted for 5.9%. Online sales of agricultural products, and collection and issue of sales and retail information are restricted by economic, skills, and cultural level. It is difficult to form seamless docking with the
e-commerce platform information.

4 Paths for upgrade and transformation of fresh product e-commerce in the whole industry supply chain

4.1 Establishing data-centered e-commerce platform under the management of whole industry supply chain

4.1.1 Platform building goals. The whole industry supply chain of fresh agricultural products is the whole process of safe, nutritional, and healthy fresh agricultural products taking the consumer as guide, from source of agricultural industry chain, through planting and purchase, trade and logistics, raw materials and feed raw material processing, breeding slaughtering, product processing, distribution and logistics, brand promotion and sales, to realize safe and traceable fresh agricultural products. Taking the data as the link, the big data technology can integrate the management of the whole industry supply, and bring about revolutionary changes in production mode, circulation mode, and consumption mode of agricultural products. Under the condition of whole industry supply chain management, the e-commerce mode of fresh agricultural products with big data as the core includes identification of basic data source, data acquisition, data storage, data analysis and mining, and data application. Through establishing cloud computing big data center, it is able to use Internet to apply the big data to participants, government, platforms, e-commerce enterprises, and consumers in the whole industry supply chain, take the big data as the basis to conduct quality and safety supervision of fresh agricultural products, optimize the storage and delivery resources of agricultural products, make decisions for production of agricultural products and consumption of agricultural products, and inquiry of traceability of agricultural products, to provide all sided services for e-commerce operators and consumers.

4.1.2 Functions of big data e-commerce platform. (i) Increasing virtual transaction size, effectively solving the problems such as too many links of fresh agricultural products, high logistics and transportation cost, high consumption, and high inventory cost, and making the production and sales become much easier, to promote increase in circulation efficiency of agricultural products and optimization of industry chain of agricultural products. (ii) Reducing the costs and increasing the profit points. Big data e-commerce platform can shorten the purchase cycle of e-commerce enterprises, and shorten the cycle of commodities, accelerate order processing and delivery of agricultural products, to realize maximization of benefits of e-commerce enterprises and win-win objective of the supply chain. (iii) Supplying data resources for enterprises in the supply chain, realizing resource share of global fresh agricultural product market and enterprises, promptly knowing demands of consumers and supply and inventory of suppliers, and individualizing delivery services. (iv) Driven by big data, large fresh agricultural product enterprises can strengthen the cooperation with upstream and downstream enterprises in the supply chain with the aid of the e-commerce platform, promote the improvement in production of fresh products, distribution and after-sale service of e-commerce operators, and realize the establishment of the quality standard system and traceability system of fresh agricultural products from field to dining table. (v) Predicting the price and difference trend of products with the aid of big data, saving money and finding the optimal purchase time for customers, and better serving consumers, to strengthen competitiveness of enterprises. (vi) Producers can inquire data with the aid of App and make decisions for production of agricultural products according to dynamic data of market.

4.2 Transforming and upgrading e-commerce of fresh agricultural products with the aid of big data technology

4.2.1 Using massive data driving to realize precision marketing of e-commerce of fresh agricultural products. From the characteristic shop "seizing the fresh" of agricultural products to "gathering fruit" of Juhuasuan platform, even in the background of various innovation mode of e-commerce operators of agricultural products, there is huge potential of big data in precision marketing of e-commerce of fresh agricultural products. Apart from collecting conventional data sources, e-commerce platforms also integrate new data sources such as social media, to break the boundaries of traditional data collection sources. Based on data analysis, it is able to accurately predict the demands of users, achieve precision recommendation, precision promotion, product precision preference portfolio, precision pricing, precision early warning of loss of customers, to provide more precise commodities for users, implement active marketing strategies, and increase active purchase and sale opportunities of commodities, and realize precision marketing with data driving.

4.2.2 Using internal and external big data to integrate logistics resources, share the data sharing scale, and realize high efficient logistics of e-commerce of fresh agricultural products. At present, the distribution of agricultural products is decentralized and small, and it lacks effective distribution data sharing mechanism. Thus, the real-time sharing and collaboration between enterprises are difficult. Therefore, under the premise of improving the industry concentration and unifying standards, it is possible to effectively integrate internal data of e-commerce enterprises with external data, drive integration of cold chain logistics resources, and realize large scale sharing of data. First, through the e-commerce platform, it is expected to streamline the information and data of production and circulation of fresh products, make the commercial operation become faster, and realize shorter logistics distance and higher efficiency. Second, through analysis on big data of comments of users about logistics services, e-commerce enterprises screen logistics cooperation enterprises, to make better cooperation and seamless docking. Third, with the aid of big data, it is possible to integrate cold chain distribution resources using Internet of Things and Internet technologies, to realize integrated distribution of fresh agricultural products, and promote reasonable cold chain distribution and high efficient services. Fourth, through analyzing and processing big data such as inventory volume, time, tempera-
4.2.3 Establishing big data based quality standardization system and traceability system to guarantee quality and safety of fresh agricultural products. From field to dining table, fresh agricultural products have long supply chain, and factors influencing quality and safety are various. The emergence of big data makes it possible to increase the full coverage of agricultural products and visualized monitoring of the whole process. In supply chain of e-commerce, with the aid of modern agriculture Internet of Things and RFID, positioned tracking, sensor, information security and Internet of Things integration technology, e-commerce enterprises can establish e-commerce product traceability platform with fresh agricultural product barcode database as the core, to link standard database of agricultural product quality of the state, local areas, and enterprises, product quality credit database, test database, so as to realize downstream and upstream quality traceability and visualized monitoring. For consumers, it is able to carry out product origin inquiry, standard inquiry, quality warranty period inquiry, logistics traceability inquiry through mobile phone terminal, realize real-time data docking, scan barcode; for suppliers, it is able to realize information interaction between suppliers and purchasers, establish the information exchange mechanism adapted to online transaction, improve the credit level of e-commerce enterprises, establish quality and safety sharing platform, and promote link between large and medium-sized electronic commodity platform and e-commerce traceability platform.

4.2.4 Using big data to create honest fresh agricultural product e-commerce environment. "You can not dig the treasure and break the faith". This is an ancient business rule. In social morality, it plays a fundamental role and is also the essence of modern market economy. The e-commerce operators are not honest in following aspects; issuing false information, committing online fraud; selling inferior fresh products; not fulfilling service obligations and not delivering service in promised time, which tampens confidence of consumers; business secrets and customer privacy cannot be protected. Transaction parties do not know each other, and the transaction relies upon the honesty.

(i) Using massive data and cloud computing, it is possible to establish massive credit information database. Unfair competition and price promotion in violation of regulations will be recorded, and every e-commerce operator is real and can be traced. (ii) Rapid data processing and credit evaluation. For example, Taobao has established the credit level system including star, diamond and crown. The credit level is indicated conspicuous position of online shops, for reference of consumers. It is recommended to use big data to help creditable people make money but make people not keeping faith make no money. (iii) Making credit data monitoring. Through the big data technology, it is able to establish a series of online behavior monitoring measures, identify possible actions of non-integral operators, including fraud, account theft, violation of intellectual property rights, sale of fake and shoddy goods, sale of prohibited or limited sale of commodities, and issue of illegal information, to help creditable operators obtain more business resources, connect credit and commercial value, and promote operators to take the credit as their life. In sum, the e-commerce of fresh agricultural products will enter the big data era from the era based on user and sales volume. E-commerce enterprises collect, analyze and integrate massive data of consumers, to explore commercial value \cite{12}, to promote individualized and precise marketing. The whole industry supply chain data, as bridge between e-commerce enterprises and between enterprises and consumers, will become more and more useful resources, and guide fresh product e-commerce enterprises to realize ordered supply chain, high efficient logistics, precise positioning, and individualized services.

References