

## Research on the Integration of Agricultural Product Supply Chain Based on Consumer Benefit

Ru-xin WANG

College of Business Administration, Guangdong University of Finance and Economics

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**Abstract.** The development trend of economic integration and marketization, supply chain build-up and integration is becoming more and more important in the agricultural field. Nowadays, the integration of agricultural products supply chain in China is entering a whole new level. The contradiction under this level focuses on the consumers' benefits. The prices of agricultural product keep rising, which leads to consumers' benefit loss. The safety issue of agricultural product causes the loss of consumer trusts seriously, and finally influences the interests of producers. In recent years, the appeal of food safety gets more frequently, which will arise awareness of the whole society. How to protect customers' benefits by agricultural products supply chain build-up and integration has become a problem. The article is based on a case about practices of agricultural products supply chain management in a typical area, which takes vegetables and fruits supply chain as research sample, incomplete contract theory, marketing channel theory, customer value theory, and game theory. The goal is to protect consumers' interests, explore the model of agricultural products integration in China under the reality restriction, and to make improvement and innovation.

### The Application of Supply Chain Management Theory in Agricultural areas

Recently, the idea of supply chain management has been brought into the agricultural fields. It arise awareness of scholars and managers. (Frank and Henderson, 1992) Compared to other product supply chain, the specialty of agricultural product supply chain is as below, as agricultural products have strong perishability, and the stability of the supply chain is weak, also because the products are consumed by people, the freshness and safety of the products are being paid more attention. Thus, improve the freshness and safety is becoming a very important issue of agricultural products supply chain management. (Yu Min and Nagumey, 2013)

Recently, the idea of supply chain management has been brought into agricultural products transportation and sales in developing countries and areas. There are some successful cases in the countries and areas in Asia, Africa, and Latin America, for example, vegetables in Thailand, (Editors, 2001), Fruits in Vietnam (Mergenthaler et al., 2009), fruits in Mexico, Chili, and Costa Rico (Aksoy, 2005), horticulture in Kenya (Neven and Reardon, 2004). There are more and more cases showing that developing areas could improve their competency of agricultural products by supply chain build-up and integration innovation. The more important thing is that optimized supply chain systems can also benefits the weak ones in the upstream. (Edward et al., 2009) Since the 80s in the last century, the idea of agricultural products supply chain has been brought into China after the reform and opening-up policy. As the largest developing country in the world, the practices of agricultural products supply chain management are in the spotlight. (Guowen Wang, 2006)

The rising prices of agricultural products lead to consumers' benefits loss. Since the beginning of the century, the prices of agricultural products have been rising, especially the fresh vegetables and fruits. According to the Chinese statistics bureau, the price of fresh vegetables was 18.7% higher in 2010 than that in 2009. The number of fresh fruit is 15.6%. The main reason for the price rising is high transportation cost. This cost takes the largest proportion of retail price. According to the agricultural department information center, under the retail price of vegetables and fruits in 2010, the transportation cost from the field to the whole sale market is 36%, the cost among the city is 33%, meaning the transportation cost in total is around 69%. There are too many nodes in the transportation processes; the cost is too high, especially the last kilometer, which leading to expensive vegetables for consumers.

Food safety issue leads to consumer trust loss. In the past recent years, the food safety problems in China are becoming more and more serious. There are many food safety incidents such as Melamine issue, poison potatoes, fake organic food problems, poison bean sprout, Clenbuterol issue and so on. These incidents arise the awareness of food safety for consumers, also shatter their trusts on food quality and safety. (Yingheng Zhou, 2011) The loss of trusts brings potential problems for Chinese agriculture. The rumor of "Fruit Flies in Big Orange that jeopardize people's health" in 2008 spread all over the country, which caused panic among consumers and led to difficulties in orange circulation and sales. That caused great loss for orange industry in Sichuan and Hubei Province. Likewise, another "Poisonous bananas" rumor hit the banana industry very heavily. Many farmers suffer great losses.

### **Circulation Condition of Agricultural Products Supply Chain Integration**

After Chinese economic reform, agricultural industry has entered a whole new level. The main contradiction of this class turns to agricultural circulation and sales from production (Meisi Wen, Shunjiang Yang, 2000). These basic conditions are very important for modern agricultural development and supply chain integration.

The total amount of Chinese agricultural product has been changing from insufficient supply to surplus since economic reform. The market has been changing from sellers' market to buyers' market. Thus, the demand of agricultural products is playing the key role in supply chain integration.

Analyze the plant conditions, circulation conditions, and demand conditions based on the view of history development. The agricultural product supply chain will make changes along with the changes of those basic conditions.

### **Agricultural Products Supply Chain Analysis Based on Consumer Interests**

Since 70s in 20th century, all industries all over the world have been facing the changes from "sellers' market" to "buyers' market". The total amount of Chinese agricultural product has been changing from insufficient supply to surplus since the 90s, and the market is becoming buyer's market from sellers' market. The consumers of agricultural products are no more price taker. They have more information than ever, and they have higher requirements on products prices, quality, and safety. They take the initiatives on the product selection and choose the most appropriate products to achieve their benefit maximization. Thus, agricultural products supply chain integration in this market economic situation needs to focus on consumers' benefit maximization, meet their demands on prices, quality, and safety. As for individuals on the supply chain, each one needs to strengthen cooperation, integrate inner and outer resource,

and add more value to consumers' perception through a series of marketing strategies. By doing so, they will be able to reach more customers, maintain the relationships with them, and get the continuous advantages on the supply chain and secure the position in the market.

Product prices, quality, and safety are the three basic problems that consumers care about the most. Whether agricultural products supply chain integration will help lower the prices, improve the products' quality, and ensure the safety or not will be another criteria for verifying the success of supply chain integration. Recently, the Chinese government starts to pay attention on this issue. In September 2012, Commerce Department announced an article "Guidance on propelling fresh agricultural products circulation innovation", which underlines the main goals of achieving a better circulation environment, cutting the costs and nodes, and improving efficient through agricultural products circulation innovation.

Agricultural products' prices have been rising since 21th century (Chinese agricultural economic committee, 2012), especially fresh vegetables and fruits. According to Chinese Bureau, the price of fresh vegetables in 2010 went up 18.7% than that in the year before, and the price of fruit went up 15.6%. The rising prices lead to consumers' benefit loss. One of the main reasons of price inflation is that the transportation costs keep rising. Transportation costs are the largest proportion of prices of fresh vegetables and fruits. According to agricultural information center in 2010, among vegetable retail price, transportation cost from the fields to wholesale market takes 36%, cost within the city is about 33%, meaning the transportation costs take 69% (Zhenya Zhou etc. 2012). Excluding inflation, there are too many nodes through Chinese agricultural products transportation; prices soar especially at "the last kilometer", which leads to the high costs, and the retail prices. Hence, cutting the unnecessary transportation processes through supply chain integration is vital to lower transportation costs, and finally to lower the retail prices.

The main agricultural supply chain integration method is wholesale driven, which take wholesalers as leaders, agricultural products agents or farmers cooperation organizations as channels, and integrate individual producers and sellers through the wholesale market system. On this supply chain, agricultural

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products from production to the terminals usually need to go through five steps including intermediary agents, production fields wholesale, distributors wholesale, second level distribution, and retail. There are another five processes including trading, products transportation and unloading, selection, classification, and packing in each step. These processes needed to be repeated five times through the steps. Businessmen of each step need to pay labor fees to get the processes done, as well as rent. Because of the perishability and fragility of fresh products, there are product losses after transportation, unloading, and selection a few times, which will be costs loss. In reality, there are more transportation steps for long distant product transportation, such as the examples of Chinese vegetable transportation association Zhongjiu Dai, 2012, if melons in the winter from Hainan Province are transported to residents' vegetable baskets in Shijiazhuang City, they usually need to go through production collection, wholesale, immediate market in Haikou City, Xinfadi market in Beijing, markets in Shijiazhuang City, supermarkets or vegetable markets. You can how many transportation steps, and how high the costs are. Unnecessary steps will be cut off through further supply chain integration. Through the process, agricultural cooperatives will take the

places of agents and wholesalers. They can get products from farmers to region wholesale markets directly, which will get rid of one transportation step.

Since the 90s in 20th century, there was a new modality of supply chain integration, company driven. Companies in agricultural products processing, transportation on the supply chain upstream get individual farmers together by contracts. On the downstream, they work with distributors through the transportation wholesale steps. Compared to traditional wholesale driven supply chain, this integration method also cut one transportation process at least. Recently, there is a new modality of supply chain integration, such as “farmers connect with supermarkets”, “farmers connect with universities’ cafeteria”, and “farmers connect with consumers” and so on. These integrations cut transportation steps and processes even more. Take “farmers connect with supermarkets” as an example, farmers cooperatives can ship products from farmers directly to distribution center of chain Supermarkets Company, and then ship to each supermarket. Through the whole process, at least two transportation processes are cut. As for “farmers connect with universities’ cafeteria” and “farmers connect with consumers”, the integration goes further than “farmers connect with supermarkets”, at least three transportation processes are cut.

With gradually rising income, many consumers have stable or slightly less demands on fruits and vegetables products, but they have a higher demand on quality aspects like freshness, appearance, and taste. The freshness of agricultural products mainly depends on transportation hours and preservation technology, and the appearance and taste rely on standard production technology.

In the very first wholesale driven supply chain, agricultural products have irregular qualities and low values, because decentralized farmers usually use traditional production mode, and products need to go through many transportation steps. The efficiency is very low, and it takes a long time on the transportation. As of the low value for the products, wholesalers usually do not use modern preservation technology like pre-refrigerated and fresh-keeping packaging considering the costs. Also, too many transportation steps make it difficult to achieve cool chain transportation all the way, which leads to bad freshness, high loss rate, and then aggravate transportation burdens. According to “agricultural products cold chain logistic development plan 2010-2015”, the cold chain rate of Chinese vegetables and fruits is only 5%. There is a huge difference with developed countries such as America, Japan, and Euro, compared to their cold chain rate 95%. Extensive transportation methods lead to Chinese vegetables and fruits loss rate to 25%, while the loss rate in developing countries is below 5%.

The freshness of agricultural products will be improved with deeper supply chain integration, less transportation steps, higher transportation efficiency, and shorter transportation time. Also, people take more serious on the product quality in the modern supply chain integration, which is good for production and transportation standardization. In the leading companies driven and “farmers connect with supermarkets” supply chain, standards for agricultural products purchase are all written down under contracts between farmers and companies as well as cooperatives. Products will be rejected if the standards are not met. At the same time, companies or cooperatives send technicians to farmers to provide standard technical guidance for production. It helps achieve production standardization. These kinds of products have more value than normal products; companies need to use modern transportation preservation techniques, conduct standard transportation processes in order to reduce loss value on the road. With transportation steps cut even further, connection between production and

distribution will be achieved, especially on the “farmers connect with supermarkets” supply chain. Hence, it will help apply agricultural products cold chain thoroughly.

Recently, Chinese food safety problems are becoming more serious, incidents like “melamine”, “poisonous beans”, and “clenbuterol” came out again and again, which became a threat to consumers’ health. People are more sensitive to food safety since then. Hence, securing agricultural products safety has become another goal for supply chain integration. On the wholesale driven supply chain, the number of decentralized farmers is large, the product quality is different, connections among people in different transportation steps are complicated, and transportation steps are too many. All of these make costs of food safety monitoring very high. Plus, once food safety incident happens, there is no way to investigate responsibilities in different transportation steps, which provides chances for opportunism behaviors and makes it difficult to secure food safety. That is the reason consumers are lack of trusts on food safety. With fast information technology development, consumers’ lack of trusts becomes a huge threat for agricultural industry. Food safety issues or rumors triggered by a few opportunism behaviors can spread all over the world and cause panic, and then make producers suffer huge losses. Take examples of “Fruit Flies in Big Orange that jeopardize people’s health” rumor in 2008 and “poisonous red beans in Hainan” in 2010, they are not only cause wide range panic among consumers, but also destroy agricultural industry. With leading companies driven and “farmers connect with supermarkets” supply chain, food safety can be effectively secured. Connections among different transportation partners get closer, the channels are more stable, and responsibilities on food safety are more explicit. It helps reduce uncertainty on the supply chain and eliminate opportunism. As the biggest responsibilities takers, leading companies and supermarkets should control farmers’ produce procedures, conduct agricultural products merchant standard, implement food safety detection, and build up traceable systems to improve product safety and protect their brand images and reputation. Supermarkets can deliver traceable information about agricultural products for consumers through billboards and product trailers in order to strengthen their trusts on food safety.

### **Build up Agricultural Products Supply Chain Integration New Model**

In the past two years, there are new supply chain integration models such as “farmers connect with consumers”, “agricultural products E-commerce”, “farmers connect with universities’ cafeteria” popping out in China. These models cut transportation steps further and reinforce information delivery on production and distribution. They have significant impacts on reduce transportation costs, improve agricultural products quality and safety, facilitate products circulation, and improve farmers’ income. Chinese government also starts to pay a lot of attention on agricultural products transportation, and comes up with an idea on products transportation innovation through applying modern technology. In 2012, “Number one file” by central authorities mentioned, “take full advantages of modern information technology to develop modern trading models on agricultural product E-commerce”, “innovate agricultural products transportation models”. “Opinions on transportation system reform to accelerate transportation industry development” by the State Council in 2012 also mentioned, we need to develop E-commerce faster, build up integrated supply chains for agricultural products, and ....

Under the situation, based on the research on “farmers connect with supermarkets” and “farmers connect with consumers” supply chain in the past few years, as well as the practical

experience on an agricultural products trading company applied with ““farmers connect with consumers” in Beijing, the author comes up with an innovative model by combining “farmers connect with consumers” with E-commerce to provide a new idea on Chinese agricultural products supply chain integration by illustrating the basic idea, advantages, impacts, and conditions.

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