

Alternative Agri-food Networks (AAFNs) to Enhance Food Safety in China

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Abstract: This paper gives an overview of Chinese food safety problem during recent seven years and whether the Alternative Agri-food Networks (AAFNs) probably enhance food safety in China mainly in a business perspective. Both economic analysis and empirical results are provided to answer several crucial questions related with Chinese food safety problem.

Keywords: Alternative Agri-food Networks, Food Safety, China

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Introduction

Alternative Agri-food Networks (AAFNs) was first developed by geography theory and then widely accepted by sociologists and ecologists (Jarosz 2000). The idea of AAFNs is to directly sell local organic agricultural products to consumers. It is a contrast to the mainstream Agri-food Networks, which is dominated by big agricultural firms, bearing huge capacity, including wholesalers and retailers, and operating globally (Hinrichs 2003, Goodman 2003, Higgins et al. 2008). Academically, Jarosz 2008 provides four major ways to define AAFNs: (1) by shorter distances between producers and consumers; (2) by small farm size and scale and organic or holistic farming methods; (3) by the existence of food purchasing venues such as food cooperatives, farmers' markets, and CSA and local food-to-school linkages; (4) by a commitment to the social, economic and environmental dimensions of sustainable food production, distribution and consumption.

The practice of AAFNs was first adopted in Japan, Germany, Switzerland at 1960's and later adopted in the United States at 1980's. AAFNs has been considered as a possible solution to the food safety problems. It has been introduced in China recently and has been highly appraised by some well-educated people who probably have higher income, especially some metropolitan residents. Those consumers choose to purchase the high-quality organic food produced by the trustable local farmers with high prices. The main channels of the AAFNs in China is farmers' market. But at this moment, there's no fixed dates and places for each event of the farmers' market. All Information about the market is posted on a Chinese social network Sina Weibo.

The farmers' market to some extent has reduced the local food safety problems in China. It encourages peasants joining organic agriculture and fair trade, in the sense that the peasants are willing to plant high-quality organic products and the consumers are willing to pay high prices for these products. However, the severe food safety problem across the whole nation seems not relieved. From January 2004 to May 2011, as many as 2018 safety related food incidents have been exposed to the public in China¹, which has upset not only the native consumers, but also visitors from all over the world. All these incidents recorded are the ones which are traceable from the mainstream Chinese media, which suggests that the actual number of the total incidents is much larger. The immediate consequence was that the food consumers, producers, and processors, wholesalers, retailers are all hurt in terms of health, monetary loss, and reputations. As we all know, China has the biggest population in the world, thus food safety is one of the most important factors to stabilize the society. In ancient times, the governors had always been keeping a saying in mind "people regard food as their prime want".

According to the situations as described above, several questions come up. Is AAFNs a good solution to Chinese food safety problem? Is the voluntary mode of the farmers' market sustainable in a long-run perspective? What is the economic implication of it? Given business opportunities in Chinese AAFNs, what factors should the potential investors take into account when they make decisions? And what should the food consumers, producers, processors, wholesalers, retailers and the

¹ Data source: <http://www.zccw.info>, this dataset has not been used by academic research yet. I have checked the dataset and found quite a few repeated records, which may not affect most conclusions but should be fixed when adopted in academic studies. Following sections of this paper will mention more about the dataset.

policy makers do to really enhance the Chinese food safety? These questions are crucial for approaching the Chinese food safety problems and also for creating better business environment.

The following sections mainly serve for answering these questions. Start from an overview of the current AAFNs in China, both economic analysis of the networks and the empirical results are provided for the interest of the involving market participants, the regulators, and the researchers.

Overview of the Current AAFNs in China

This section gives an overview of the current operation of AAFNs in China. The main form of the AAFNs discussed here is referring to farmers' market, which is operated by voluntary peasants and consumers such as Beijing Organic Country Fair, Shanghai Nonghao Farmers' Market, and Guangzhou Cheng Xiang Hui². There are two types of business modes for the suppliers. The first mode is that the investors independently build up a farm, account the costs of production and make an expectation of the profit, then form a price for the products. The second mode is that the investors do some surveys among the objective consumers and derive a price range that is accepted by the consumers. The production plan is based on the price range, which requires stricter cost accounting. Although no related regulations exist, some producers voluntarily provide the technique standards they adopt in production. Most farmers' markets are in first-tier cities in China now. Among which

² Since these markets are very new, no widely accepted translations exist. Thus I provide the original Chinese names here for future reference: Beijing Organic Country Fair (北京有机农夫市集), Shanghai Nonghao Farmers' Market (上海农好农夫市集), and Guangzhou Cheng Xiang Hui (广州城乡汇).

Beijing Organic Country Fair which was initiated in May 2010 is one of the earliest ones coming into practice. It provides a trustable local platform allowing peasants and consumers communicating directly. Till now five events have been held. Participants have achieved 2000 recently. All information about each event is released in one of the biggest Chinese social network Sina Weibo. No organizations earn money from managing or taking responsibility of these events. Products sold in the events include vegetables, rice, fruit, eggs, dairies and beverages. Although some vegetables are not as good-looking as the ones from the supermarkets, they have been sold out immediately every time the market is open.

Now let's take a look at the food prices from the farmers' market in Beijing, which are more important for both current and potential market participants. Table 1 contains a group of prices collected from Beijing Organic Country Fair in 2011. The data were collected by some market participants which are not officially published. The retail prices in Beijing in the same year are also provided for comparison. Simple calculation tells that the premium of the prices are around 200%, 1200%, 400% for vegetables, tofu, and eggs respectively, while the organic food sold in Chinese supermarkets usually has a price premium of 30% to 80%.

Table 1. Price Comparison between Farmers' market and Retail Market (Unit: RMB/kilogram)

	Beijing Organic Country Fair's Price	Retail Price
Vegetables	16	3.5~5.5
Tofu	40	2.5~3
Eggs	50	9~10

Although the prices are very high in the farmers' market, almost all products were sold out in each event in the first-tier cities such as Beijing and Shanghai. The relative high prices have also created some business opportunities. Except the peasants and the consumers, the market participants could be some investors who expect good revenues from the farmers' market. Actually, some companies have already entered this market, which purchase the existing farms or build new farms and promote the products either in the farmers' market or online.

On the other hand, notice that the products are unsalable in some second-tier cities such as Xi'an. According to the recent event held in Xi'an in March 2012, eggs were 18RMB/kilogram and Chinese cabbage was 20RMB/kilogram, soybean was 30RMB/kilogram, which look much cheaper than those from the first-tier cities. But most of the products were unsalable. Due to the fact of uneven income among first-tier cities and second-tier cities, the market performance of the farmers' market really diverts, which is an important signal for those potential investors.

The Economic Analysis

This paper is mainly organized in a business perspective, while I believe some fundamental theoretical economic analysis helps identify the problem and benefits the potential business. Till now, the farmers' market in China is mainly operated upon trust between the sellers and the buyers without any additional economic interference. However, with the grow-up of the market scale in first-tier cities, the cooperation between the sellers and the buyers might not be an equilibrium solution.

Assume both the seller and the buyer can behave high type (H) and low type (L). The high type for the seller is to plant high-quality food and low type is to cheat by planting low-quality vegetables. On the other hand, the high type for the buyer is to pay high prices and the low type is to betray by refusing to pay the high prices for the food. As we can see, the current farmers' market is operated upon both the seller and the buyer play H, which leads to a fairly good result that the seller receives high prices and the buyer get the high-quality food. However, playing (H, H) is not a Nash equilibrium in a one-shot game. As long as the seller cheats based on the buyer still paying the high price, he still receives the same high prices but the buyer results in getting the low-quality food with paying high prices, and vice versa. If the buyer refuses to pay the high prices while the high-quality food is already produced, the seller has to sell them even with receiving low prices, which is still better than receiving nothing. In that case, the buyer ends up with getting high-quality food by paying low prices while the seller suffers a lot. A payoff matrix is showed in Figure 1 according to the above game. Thus the only Nash equilibrium in this one-shot game

is to play (L, L), in which the seller does not produce high-quality food and the buyer refuses to pay high prices.

		Buyer	
		H	L
Seller	H	(2, 2)	(-2, 4)
	L	(4, -2)	(0, 0)

Figure 1. Payoff Matrix of the Seller and the Buyer in Country Fair

Folk Theorem tells that in order to support the outcome (H, H) in repeated games, a high enough discount factor³ is required. Which means the seller and buyer should care more about future reputation. However, if this condition is guaranteed in current Chinese food market, the AAFNs become not necessary for most of the consumers according to Chinese income level. Because the over 200% price premium is not easy to afford for most fringe consumers. In order to develop the voluntary farmers' market, further market design, regulations for the entry and operation is required.

Now let me show that how AAFNs probably work better with a small scale in economic sense. The rationale is auction. Current AAFNs create small auction markets for high-quality food, where people bid higher prices for the food in order to

³ The discount factor reflects the time-value of money, which takes a value between 0 and 1.

get rid of the low-quality food. The high prices of food offer farmers enough incentive to continuously create good quality food, which means the discount factor is high enough. Farmers will receive very severe punishment in the repeated games if they deviate from the (H, H) outcome. The punishment can be viewed as the losing high profit for their products. Thus, prices have to stay very high in these auction markets to keep the farmers' market working. With more entry of the new business, the high price premium could easily collapse. Another implication is that to keep the current farmers' market working, only rich people are effective consumers who are able to bid for the high-quality food.

Thus, relying on small scale AAFNs could partially increase the welfare of some of the rich consumers in China. However, if more potential investors would like to enter this market to enlarge the scale of AAFNs, based on the above economic analysis, the high outcome is very hard to sustain without certain level of social credibility or mature inspection system. For example, bad credibility of economic agents will finally destroy the good relationships in the AAFNs, so that the long-run risk of the investment cannot be ignored.

Empirical Results

This section provides some empirical results about the food safety problem in China. Several main negative factors causing food safety problems in China are analyzed. The original dataset mentioned in the introduction section covers period from January 2004 to May 2011 which contains 2018 food safety incidents in China. It

records the subjects of the safety incidents, the main harmful ingredients or misbehaviors causing the incidents, the time and locations the incidents took place, and also the traceable sources from the mainstream Chinese media which report the incidents. Food involved in the incidents includes: Vegetables, fruit, meat, dairy, seafood, rice, water, processed food, health food products, snacks, beverages and so on. Almost all food is involved. However, some of the subjects are missing and some of the incidents are not well defined. For example, some of the causes of the incidents are not clearly pointed out. I dropped these incomplete records and also some repeated records which happened in the same day and place while just been reported by different media. In addition, the incidents from imported food are dropped since the main focus of this paper is within Chinese domain. The final number of incidents left in the dataset is 1899. In addition, the original dataset has a category named unqualified product which is too general. I tried to fit these incidents to the following more detailed categories.

The eight main categories of the incidents are: Additives, expiration, fail in inspection, fake and inferior, foreign bodies, sanitation, unlicensed business, and wrapper. A detailed explanation of these categories is listed in Table 2. Some of the incidents could belong to two or more categories so that the boundaries of the eight categories are not absolute.

Table 2. Eight Main Categories of Food Incidents in China

Category Name	Details
Additives	Food is with additives that are now allowed, or over use of allowed additives;
Expiration	Food is over expiration date, or within expiration date but spoiled due to incorrect manipulation;
Fail in Inspection	Food fails quality inspection and being exposed by inspection sectors;
Fake and Inferior	Food is fake or inferior;
Foreign Bodies	Food contains foreign bodies;
Sanitation	Food is polluted either by nature or human manipulation;
Unlicensed Business	Food is produced or processed by unlicensed business;
Wrapper	Food has poisonous wrapper or containers;

Figure 2 shows the distribution of the eight categories during the sample period. From the distribution, we can see that during the sample period, 53% of 1899 food incidents in China belong to the category additives. The second largest category is fake and inferior which counts 15% and the third is fail in inspection which counts 10%. Obviously, credibility is a main issue behind these specified categories. AAFNs have nothing to do with the above problems if credibility is not guaranteed.

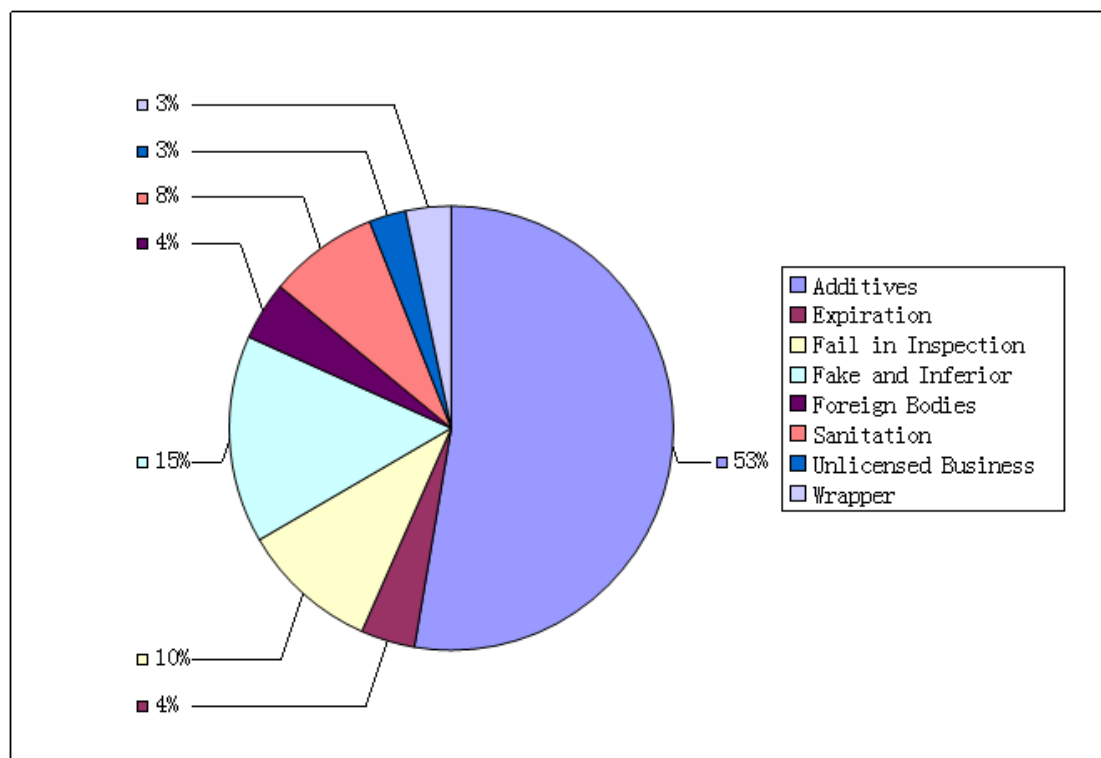


Figure 2. Distribution of the Eight Categories of Chinese Food Incidents

Concluding Remarks

Answers for the questions listed in the beginning of the paper are more clear now. According to the political, cultural and historical situations of China, AAFNs solely base upon voluntary behaviors may not be a good solution to Chinese food safety problem. Even though some consumers are probably better off, most consumers are still exposed in high risks. The empirical results suggest that in order to really improve the food safety in China, the producers, processors, wholesalers, retailers and policy makers should focus on those key factors whenever they need to make decisions. In Chinese food industry, the problems people are in face of is not purely the confliction between large scale food production and high-quality food demand, but also the belief of social credibility. The AAFNs could be a good solution

for the first confliction while not the later one, because the relationship based upon trust and cooperation is critical to the strength and vitality of the AAFNs (Jarosz 2000). As long as these key factors are well controlled, the AAFNs become worthy to develop and invest in China.

Potential investors should realize the long-run risk of this growing market. Blindly investing in AAFNs in China could induce the small auction market collapsing. On the other side, policy makers could invest in making more detailed regulations on AAFNs, providing the technique standards, and improving the inspection system.

As a by-product, this paper also provides an overview of the AAFNs in China. The information from this study contains some reference value for the potential investors in the Chinese AAFNs. Also, the key factors pointed out here will contribute to the issue of enhancing Chinese food safety.

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