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Efficient food safety regulation in the agro-food wholesale market

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Abstract

This paper analyses a framework of food safety regulation system in agro-food wholesale markets as revealed by a recent investigation in Beijing, which consists of government regulation and market regulation. The results show that it hasn't formed a standardized and uniform food safety regulation system for the agro-food wholesale market, and the government regulation permeated in all aspects of the market, which make the food safety management at higher cost and lower efficiency. Therefore, the study intends to develop a co-regulation model for food safety governance in agro-food wholesale markets. Future research is needed to empirically test this model.

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Keywords: Food safety; Government regulation; Market regulation; Co-regulation; Agro-food wholesale market

1. Introduction

Food is the God for Man is an old Chinese saying which means food is the first necessity for human's life and development, although its economic value is not high. Food safety can not only protect human's health from disease, but also be significant to national economic progress and social development. At present, China is at the key turning point of socio-economic development, especially for the food industry. After food quantity was guaranteed, the pursuit of food safety has been inevitable (Lu, 2002). However, due to small-scale or even ultra-small-scale agriculture production, coupled with the complicated food distribution system, the status of food safety in China has become increasingly prominent (Han, 2007). Recently, public has become increasingly concerned about the quality and safety of food in the market due to a series of food safety issues, such as milk contaminated by melamine. The Chinese government has put forward the idea of food safety supervision in the overall process "from farm to table", and they also have an array of national standards, laws, certification systems, inspection and monitoring systems to enhance food safety (Calvin et al. 2006). However, the fact is that we all pay much attention to the agro-food production and processing sectors, ignoring the other elements in the agro-food distribution system (Zhao, 2008), particularly the wholesale market (An, 2006). In China, the agro-food wholesale market plays an important role in

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food distribution system, especially more than 70% of agricultural products circulated in wholesale trade (Chen, 2006; Wang et al. 2006), and it also has characteristics of sociality and commonweal for the public and consumers by ample supply of safe food on the market. Therefore, the role of agro-food wholesale markets in assuring food safety should be given sufficient attention, and it is also important for policymakers to understand the status of food safety regulation in agro-food wholesale markets, emerging the market and government regulation for food safety in the market.

In order to explore the issue, this paper presents some findings of recent investigations in 8 large and medium-sized wholesale markets of Beijing during 2008-2009, in an effort to develop a profile of China's agro-food distribution system and describe the main features of the food safety regulatory framework in agro-food wholesale markets, finally proposes a co-regulation model. The results serve both government agencies and marketers with information regarding food safety regulatory system. Our findings may provide insight into what is required in developing efficient food safety management and regulation system to build consumer confidence.

2. China's agro-food wholesale markets

2.1 Structure of the agro-food distribution system in China

In China, it has formed a relatively complete agro-food distribution system, which is divided in several outlets and involves a wide number of different intermediaries (See Fig 1). Generally, it consists of wholesale market, supermarket, free market and vertical delivery, etc. Chinese farmers are organized in different ways, large and medium-size farmers are linked to food processing companies and small farmers are either independent or organized in co-operatives associations. There are two major outlets for agro-food production, namely the local and the civil agro-food wholesale markets. The first type is formed spontaneously and located in the production area, and the second one distributes in large and medium-sized cities or the transport hub areas, which are generally state-owned, collective-owned or cooperative enterprises, which have higher transaction volume and relatively standardized management.

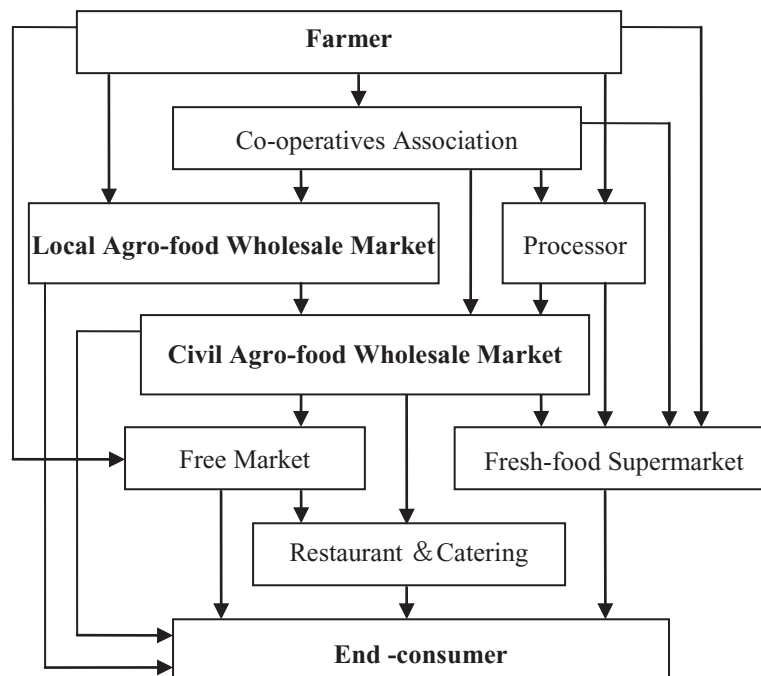


Fig 1 Agro-food distribution system in China

The agro-food wholesale market is the central link in the distribution system, which is also the centre of business and information flow. China counts about 230 million farmers, 4 million different types of agro-food producers, more than 10,000 meat slaughtering and processing enterprises, which deliver various agro-foods into the wholesale market everyday throughout China, and nearly 1,000 transportation companies provide transportation services for the market (China General Chamber of Commerce).

The fresh-food supermarket is also the main distribution channel for agricultural products in some developed countries. In recent years, they have developed rapidly in China, the number of which has reached more than 2,700 in 2006. The expansion of fresh-food supermarkets in China haven't affected the function of wholesale markets in agro-food distribution system, on the contrary, strengthened their position in the system. In May 2008, the Ministry of Agriculture associated with the Ministry of Commerce started "Farm-to-Supermarket Project", guiding the large supermarkets directly purchasing agro-food in the agriculture production areas, or in virtue of some farmers' co-operatives association. Accordingly, this modality can simplify the distribution channels and reduce the cost in distribution.

2.2 The role of agro-food wholesale market

The agro-food wholesale market initially developed in China since 1980s, then experienced the rapid growth in the period of 1985-1995 and have been in the state of upgrading and quality enhancing since 1996 (Liu, et al., 2003). In all, according to China General Chamber of Commerce, there are now approximately 4,300 agro-food wholesale markets across China, which include 1,500 local wholesale markets, and 2,500 civil wholesale markets (China General Chamber of Commerce). As the centre of agro-food spot transaction, the wholesale market has been playing an important role in facilitating the handing and distribution of agricultural products, connecting producers and retailers (or even final consumers), guiding production and increasing farmers' incomes (Chen and An, 2006). Moreover, it also plays an irreplaceable role in guaranteeing the quality and safety of agro-food. Especially for some fresh agro-foods, they could have easily foster hidden, insecure dangers of pests, rotting and mildewing during transportation, and storage and sales due to their biological characteristics.

Therefore, the agro-food wholesale market is not simply one of pass-through, as the efficiency of the link has major impacts on the food safety regulation in supply chain, and it is necessary for the agro-food wholesale market to undertake enhancing the construction of food safety facilities and reducing or avoiding diversified hazards. However, there are still many unsatisfactory factors in agro-food wholesale markets in China. For example, the coexistence of wholesale and retail is prevalent in the market, the dominant position of enterprises with standardized management has not been set up in food supply chain, farmers professional cooperatives only play a limited role (Liu et al., 2003), and market infrastructure is imperfect (An, 2006). All of these make it difficult to control and manage food safety for the markets. An overview of 8 leading agro-food wholesale markets in Beijing is then provided, and it is argued that gaining a better understanding of food safety regulation in wholesale markets could have been avail to analyze the China's food safety regulation system in distribution.

2.3 Case studies of the 8 agro-food wholesale markets in Beijing

The fieldwork and face-to-face interviews, conducted in Beijing, China, in July 2008 and 2009, which surveyed food traders and market managers in agro-food wholesale markets about their food safety awareness. The first stage survey was conducted in July 2008 across 12 agro-food wholesale markets in Beijing, and 509 traders respectively were interviewed by using a multiple-choice questionnaire, obtaining an overview of the basic situation of agro-food wholesale markets and their perceptions of food safety and food safety management. The second stage survey was conducted in July 8-22, 2009, and firstly a vice manager of Huilongguan wholesale market was interviewed which contributed to test piloted questionnaire and confirm questions clarity. According to his feedback, we revised the questionnaire, and finally, as indicated previously, we interviewed 8 participants (6 vice managers, 2 office directors) from 8 agro-food wholesale markets in Beijing. A typical respondent required approximately two hours to complete the questionnaire.

All of the 8 agro-food wholesale markets have a large geographical reach, and the food trades in these markets are comprehensive, covering an enormous range of agro-foods, which include vegetables, fruits, grains, edible oils,

poultry and eggs, seafood products, etc. (See Table 1) The largest agro-food wholesale market in Beijing is the Xinfadi market, which was established in 1988 and built on the land of the Xinfadi village, nowadays, it could meet around 80% of vegetables demands of Beijing. Similarly, the Yugezhuang and Dazhongsi markets was formed in an even earlier time, in 1986, and both of them supplied large shares of the Beijing market, however, the latter was disbanded in 2003. The original traders in Dazhongsi market were divided into Huilongguan and Jinxiudadi markets. Among the 8 agro-food wholesale markets, the Yugezhuang market is minimal in size, but the nearest one from the center of Beijing, which has focused on supplying higher valued and quality agro-foods. Both of Yugezhuang and Dayanglu markets are in the collective ownership; the markets of Xinfadi, Shunxinshimen and Jinxiudadi are share-holding corporation Ltd; the Baliqiao is cooperative enterprises; only Shuitun is fully state-owned and Huilongguan is private enterprises (See Table 1).

Table 1 The profile of the 8 agro-food wholesale markets in Beijing

Name of the market	Date of foundation	Ownership	Area (ha)	Annual Turnover (billion ¥)	The first class for wholesale trading
Yugezhuang	1986	State-joint	13.0	6.5 ⁽²⁰⁰⁷⁾	Fresh meat/vegetable/spice
Xinfadi	1988	Share-holding	101.3	26.0 ⁽²⁰⁰⁸⁾	Vegetable/fruit/meat
Shunxinshimen	1994	Share-holding	46.7	6.5 ⁽²⁰⁰⁸⁾	Poultry/vegetable/seafood
Shuitun	1996	State-owned	53.3	5.2 ⁽²⁰⁰⁸⁾	Vegetable/fruit/ grain /spice
Dayanglu	1997	Collective-owned	35.3	10.4 ⁽²⁰⁰⁸⁾	Egg/vegetable/fruit/meat
Baliqiao	1998	State-owned	43.3	3.8 ⁽²⁰⁰⁸⁾	Meat/grain/vegetable/fruit
Huilongguan	2003	Private	73.3	12.0 ⁽²⁰⁰⁷⁾	Unsalted fish/egg/pickle
Jinxiudadi	2003	Share-holding	66.7	10.0 ⁽²⁰⁰⁸⁾	Spice/dried fruit/grain

3. The regulatory framework in China's agro-food wholesale markets

Food safety regulation can be divided into two categories according to their different implementing subjects: *i*) public regulation, which implemented by the government in a compulsive way, aiming to improve food safety status and strengthen the public confidence in food safety, such as legislation, permission, supervision, etc; *ii*) private regulation, implemented by the enterprises (such as the wholesale market) in a voluntary way, aiming to capture increased their economic interests and market shares, such as traceability system, HACCP, GMP, ISO quality system, etc. Fig 2 compared the two food safety regulation in China's agro-food wholesale markets from three aspects: market access, transaction in the market and withdrawal form the market for all agro-foods and traders.

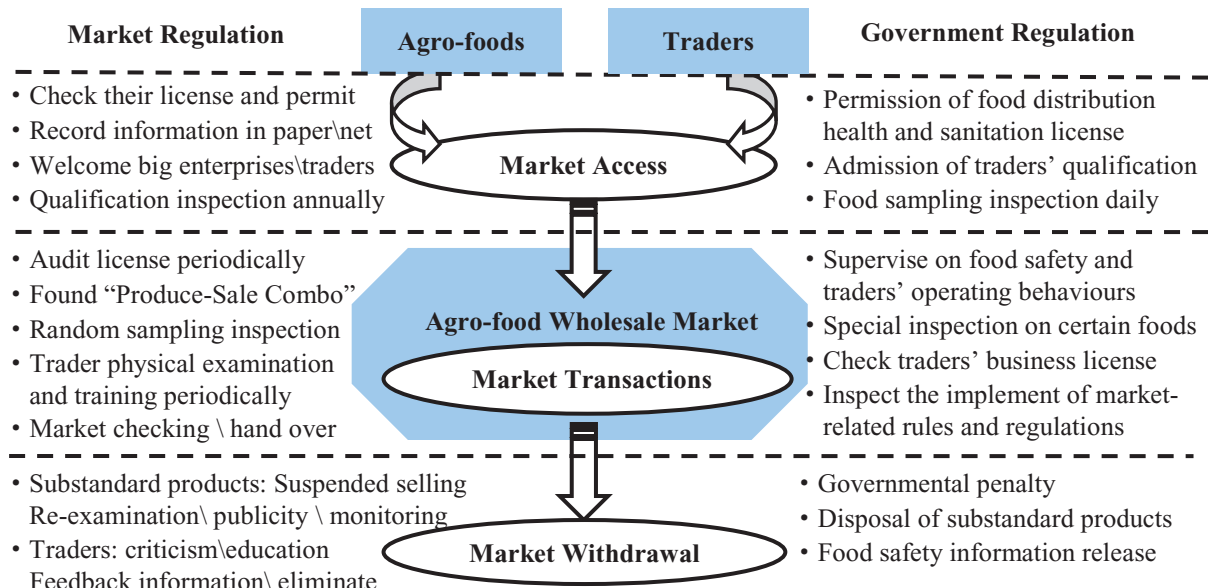
3.1 Public regulation in food safety from the government

According to Food Safety Law issued on June 2009, the current food safety regulation system in China is characterized by multi-agency control. Based on the law, different agencies are assigned to control the different tiers of food supply chain, i.e. Department of Agriculture (DA) is responsible for supervising the primary agricultural production, Administration for Quality Supervision, Inspection and Quarantine (AQSIQ) for food manufacturing and processing, Administration for Industry and Commerce (AIC) for food distribution, State Food and Drug Administration (SFDA) for food consumption, and Ministry of Health (MOH) for general supervision and harmonization, etc. The food safety of wholesale trading is mainly in the charge of AIC, which manages the traders' distribution permission, so the food trader who would like to enter or transact in the wholesale market must get the permission from AIC. When they trading in the market, other administrations (such as DA, AQSIQ and MOH) would also involved in food safety supervision and regulation according to their different function. The detailed information about government food safety regulation is illustrated as follows:

- Market access: permission and supervision of the food production license (MOH and AQSIQ), distribution license (AIC), the traders' health certification and sanitation license (MOH); foods sampling inspections before them entering the market daily, etc.
- Market transaction: special food safety inspection and supervision from relevant administrations on certain

foods, such as agricultural products (DA), wine products and pork (Ministry of Commerce, MOC), food additives and measuring instrument (AQSIQ); supervising market traders’ operating behaviours regularly or irregularly (AIC); checking the fake products or counterfeit (AIC); inspecting the implement of rules and regulations related to food safety and the market (MOH, AIC and MOC), etc.

- Market withdrawal: governmental penalty; disposal of substandard or unsafe products; compensation for consumers; information release related to food safety, etc.



Source: Based on the information from 8 market managers’ face-to-face interviews

Fig 2 Framework for analyzing food safety regulation in agro-food wholesale markets in China

3.2 Private regulation in food safety from the wholesale market

We interviewed 8 market managers and obtained enormous information about how they manage and guarantee the food safety in agro-food wholesale markets. In this stage, most measures were identified to be important in the 8 agro-food wholesale markets in Beijing, and we illustrated the food safety regulatory framework in the market.

Market access: The main restrictions for entering and trading in the wholesale market, which include entry qualification (distribution license), regulations on their wholesaling products (producing area, quality and safety). For example, when entering the market, the food producers or traders must be able to provide their distribution license, producing area certification and quality inspection certification of agro-food, and the market would keep the information with documentation and electronic data. Besides, the names, addresses, telephone numbers and vehicle licenses of food producers and traders would also be recorded by the market, furthermore, these information must be ensured updated annually (Fig 2). In China, agro-food wholesale markets generally conduct voluntary agricultural product tests for food providers before them entering the market, especially for individual food producers and traders, whom wouldn't like or have no awareness to take food tests due to their high costs. Moreover, it also hasn't formed strict food-testing requirements, which are different respectively among markets. Take Xinfadi market for example, vegetable traders are given discount charges if they can provide quality inspection certification of their vegetables. In addition, several markets give priority to the large enterprises, traders and brand products entering the market, and the market managers would revisit, censor and spot-check the food enterprises annually.

Market transaction: When trading in the market, traders’ operating behaviours and their equipment in fixed stalls would be examined daily, and their distribution licenses must be inspected annually by the market managers. The market would train the food traders periodically in order to improve their awareness of food safety knowledge and reduce the food safety risks during wholesale trades. Nowadays, some markets have found the “Produce-Sale

Combo” to coordinate the relationships between producers, traders and markets. This combo convenes meetings regularly, and it makes recognition of good producers, manufacturers and traders, criticizes and punishes the offending ones. In addition, some markets also carried out a number of activities to encourage traders standardizing business practices. All of the 8 agro-food wholesale markets have been equipped with their own testing laboratories, and they could handle agro-food routine testing and rapid testing daily. However, it is different for testing equipments, sampling types and frequencies among the 8 markets, and currently there are no uniform standards and regulations for these in China. On the packaged food quality and safety control, the markets take daily spot-checks primarily on the basis of following information, whether they are packaged expired, fake and shoddy products, 3-free products, etc. For bulk foods, the markets generally take sampling inspections in their own labs, or they send up samples to the censorships when they don’t have related testing instruments, such as, Beijing Physical and Chemical Analysis Center and other commercial testing laboratories.

Market withdrawal: When substandard or unsafe products are discovered in daily sampling inspections by the market or other relevant agencies, firstly the products must immediately be taken off the shelf, the samples will be sent to inspection agency and be re-examined, and relevant information will be reported to the administrations. Re-examination confirmed the sample be in question, the wholesale market would take the same batch off the shelf and prohibit them circulated in the market. Market managers can only educate and criticize the traders, publicize their names in market billboard, but they don’t have right to punish them.

4. Discussion: efficient food safety regulation system

As for the agro-food wholesale market in China, it hasn’t formed a standardized and uniform food safety regulation system. Government regulation and market regulation permeate all aspects of wholesale market, which results in the lower supervisory efficiency and higher regulatory cost. In this section, we discuss the current and existing problems which emerge from our survey in relation to the three aspects in the framework (Fig 2) of food safety regulation system in agro-food wholesale markets.

4.1 The innovation of the government regulation

The government regulation in agro-food wholesale markets, as indicated previously, Administration for Industry and Commerce is in charge of food safety supervision for agro-food wholesale markets, and other administrations play an assistant role, such as Department of Agriculture, Administration for Quality Supervision, Inspection and Quarantine and Ministry of Health. And they have their own supervisory emphases, which is characteristic of multi-agency and would lead executing institution by different subjects and crossed functions. As for wholesale markets, they must be in charge of the cost of food safety testing. However, most of the market managers consider that it is not their responsibility. Thus, the government regulation system should be innovated and become more efficient in food safety testing due to its commonweal for the public and society. Further, the government bodies should provide extension services to the wholesale markets, rather than simplistic permission and inspection. The government body can guide and inspire the market to take their responsibility of food safety regulation. Diversified subsidized credit and fund supports should be provided to the markets improving their food safety regulatory measures, testing instruments and materials, which is crucial in bringing down the market executing costs substantially.

4.2 Standardization of the market regulation

The implementation of food safety controlling practices and supervisory principles could reduce the inadequacies and non-conformities in the food distributing areas. However, the direct and immediate effect does not always occur. The current market regulation system has brought to light various shortcomings regarding the incorrect checking procedures and the non-standard management. Therefore, the difficulties encountered in China’s wholesale markets are studied in this context.

- Some good practices codes exist but are not implemented: for example, the sampling inspections before the agro-food entering markets always do not apply out of the market self-interest (high testing costs).
- The lower incredibility of some market regulatory measures: such as certifications of food producing areas

and quality inspections provided by the traders, there are no uniform standards and clear requirements for them in different agro-food wholesale markets, and most traders generally get them from local associations or township government, which haven't equipped adequate food safety testing instruments and materials. Otherwise, some township governments slacked off supervising the traders and foods due to protecting their local economic interests, and give the certifications directly without testing or inspecting.

- The lower level of standardized sampling in market transaction: at present, there are no certain performance standards for sampling variety, frequency, testing items, etc. Some markets prefer to detect the foods at lower cost and shorter testing time, while ignoring those expensive and time-consuming food detections.
- Utilization of testing rooms: although testing rooms in 8 agro-food wholesale markets have been equipped with adequate testing materials and in good condition, some are not appropriately utilized. Some expensive precision testing instruments are basically idle.
- Inadequacy of detection staffing: our survey demonstrates that it is extremely deficient for professional food safety inspectors in current wholesale markets, generally less than 10 inspectors, which is incompatible to the large volume of market transactions.

4.3 Management of market traders

The traders in agro-food wholesale markets have a major role in guaranteeing the quality and safety of food in distribution, and it is no surprise to find that traders' educational background has a large impact on attention to food safety. Our study shows that the traders are very often people from a low social and cultural level, and their educational levels are associated with their personal hygiene. Furthermore, in spite of training offered to food traders in most markets, they do not always put it in practice. So, there is a need to develop some new and effective training methods and increase the training frequency. Ultimately, we can achieve the goal of improving the traders' knowledge and standardizing their operating behaviours. Otherwise, in contemporary agro-food wholesale markets, small traders are often at a disadvantage in relation to larger commercial traders who can transact larger volumes of quality-assured agro-food, have better access to information, and possess superior food safety controlling power. Small traders frequently have limited education, technical skills and poor access to information for improving their food safety controlling practices. Therefore, various approaches should be proposed to improve the prospects of small traders in agro-food wholesale markets, including collective actions via trader organizations and market organizations.

4.4 Management of information

The role of information is crucial, which can create economies of scale in distribution and marketing, and traders can achieve efficiencies in distribution. For example, through the internet, information screen and bulletin board in the market to sell products, which can lower marketing costs. However, there are more information about food price and insufficient in food safety and quality. It is hardly found that food safety sampling and inspecting results in wholesale markets and their websites. Apart from the price, the quality and safety of food become critical when the public increasingly concerns. Hence, the problems of information (food safety and sampling inspection results) should be strengthened through the market, traders and government. Furthermore, there are little information exchanges among different markets, so the substandard products would flow into other markets when they are forbidden selling in the originally market. Furthermore, the government should establish a unified and authoritative channel for information release, avoiding public cognitive confusion, and it should also strengthen its severity and public mandate, otherwise the public would not attach importance to its role in food safety supervision.

4.5 Interaction between market and government

Interactions between market and government, among different wholesale markets are crucial for the higher efficiency of food safety regulation. However, we find by the survey that interactions between market and government are frequently characterized by lack of trust and rare alliances, and different wholesale markets usually keep their distance from the other markets and the government. The request for the efficient food safety regulation made it necessary to build relations with a broader range of government and different markets. Some associations have already held some meetings or other kinds of measures to promote interactions and collective activities involving markets, government agencies, researchers and producers in food safety regulation system. However, the

associations have played a very limited role in the current food safety regulation in China, and they always focus on the price and quantity of food supply. An effective food safety regulation platform is urgent to be established, which can facilitate interactions between wholesale markets, markets and government agencies, increase efficiency in food safety regulation, and reduce regulatory costs.

4.6 The co-regulation model for food safety governance

The current food safety regulation system would lead executing institution by different subjects, crossed functions and unclear responsibilities. Moreover, the scientific food safety regulation system has not yet been established, the testing and inspection system still needs to be strengthened, and the management system also needs to be further rationalized. All of these have increased the difficulties of food safety management in reality. And although the Chinese government has implemented many policies and laws on food safety, the public has little consciousness of correlative information. How to reform the regulation system in China's wholesale markets? In this section, a co-regulation model (Martinez et al, 2007) is proposed which actions by the government and the market sector in the wholesale market food safety program. The co-regulation system (Fig 3) for food safety has four main components:

- The initial step is to enact a “wholesale market standards”, with which all markets comply and agreed to replace their individual food safety audit processes by a single audit procedure. It is the responsibility of the government regulation.
- The second is to develop and implement the food safety guaranteeing scheme for wholesale market itself, and they should identify critical control points (CCP), take responsibility for implementation and control of their food safety guaranteeing scheme, and maintain performance records. The government in here is responsible for approving these rules and monitoring compliance.
- Finally, the government should take the responsibility for market withdrawal. They could post the inspection results outside markets, and enforce a deterrent-based strategy including an improvement notice, formal caution, closure of food business, prosecution and disqualification.
- Thematic networks: it is to facilitate the relations between market and government, and the transference of information among different markets.

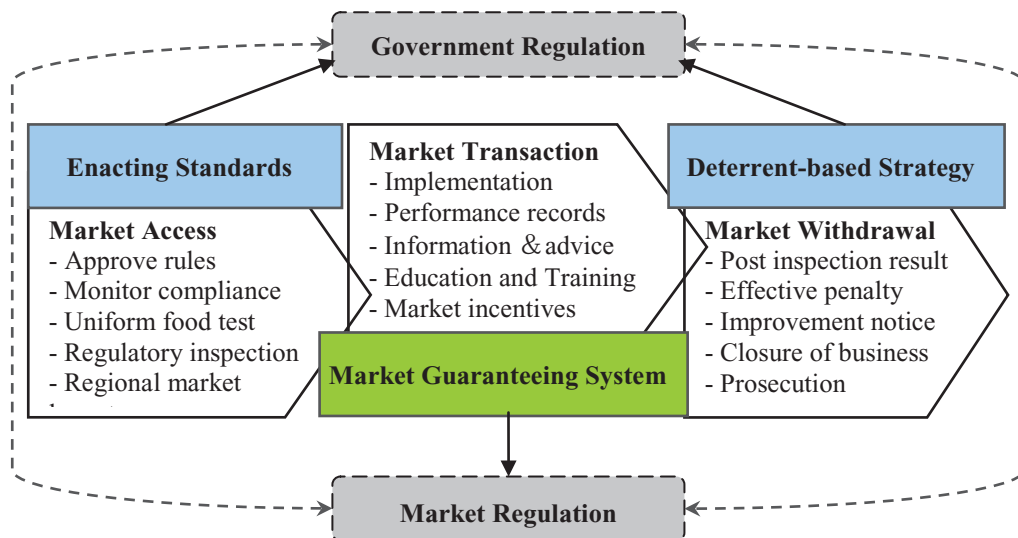


Fig 3 The food safety co-regulation model in agro-food wholesale markets

5. Conclusions

The agro-food wholesale market is an important role in food distribution system in China, and it is also a major component of China's efforts to improve food safety. Our study showed that market management could effectively improve the quality and safety of food, whereas it played a very limited role currently. In addition, our findings

indicated that the current regulation system for food safety in wholesale markets leads higher regulatory cost. For example, the effectiveness of the market food testing and inspection was weak and had significant variance between different markets; testing from the government and market are coexistent; information exchanges among markets is limited; lack of uniform standards and regulations; less interaction between government and the market; inadequate consultation with other interest groups. Therefore, the results from the current study suggest that more improvements are required for agro-food wholesale markets, both in hardware and software facilities, especially in food safety control. Besides, our results suggest that most market managers and traders were concerned about food safety out of their own economic interests, rather than guaranteeing the public health, because most of them had lower educational levels and didn't understand the importance of their behaviours to food safety. So it was essential for the market to guide and train these managers and traders in order to improve their perceptions of food safety.

Some examples in Beijing have presented where the lack of co-regulation has resulted in duplication of effort. As the supervisor to the wholesale market, the government has a guiding and complementary role to play. There is a need for the government to enact standards of market access and correct specific market failures in food safety regulation but not to check the traders and inspect food simplistically. Thus, our study proposes the co-regulation model of food safety governance, which is food safety management effort from the government and the market coordinate at different stages in the agro-food wholesale market regulatory process. This co-regulation model could potentially result in improvements in the level of food safety at lower cost and more efficient allocation of scarce regulatory resource.

In conclusion, although the sample markets are only from the Beijing area, this survey provides a chance to understand the status of food safety regulation system in agro-food wholesale markets. Our research intends to extend the study of this matter to additional areas and empirically test this model in the future.

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