

# Research on Food Supply Chain Risk and Its Management

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**Abstract:** Based on the summary of food supply chain risk and its management research, this paper explores the identification of major supply chain risk factors leading to food safety problems according to the principles of objectivity, significance, system and continuity. This paper proposes that based on the full identification of quality risk, market risk, logistics risk, cooperation risk and environmental risk in the supply chain, comprehensive analysis and targeted measures should be taken to prevent and effectively reduce and eliminate risks. Complete food information traceability system, rapid response information platform for responding to food safety incidents, and cooperation among stakeholders in the supply chain are indispensable safeguards for food safety management.

**Keywords:** Food Supply Chain, Supply Chain Risk Management, Risk Factors, Risk Control

## 1. Introduction

The food supply chain is an integrated supply and demand network, including suppliers of food raw materials, production and processing enterprises, wholesale and retailers, and consumers. As a whole, problems in one part of the chain will lead to the balance and stable damage of the entire supply chain, even undermine other supply chains. The food supply chain itself is fragile, mainly because the food has seasonal, regional, edible, perishable and deteriorating characteristics, resulting in a short food production turnaround time, many circulation links, and high requirements for storage management, inventory, and transportation equipment. As a complex system, a food supply process from raw materials products to eventually the hands of consumers, is inseparable from the close co-operation and mutual support between the various entities and enterprises in the supply chain. However, the goals pursued by each enterprise are not the same, the supply and demand situation of the food market is full of uncertain factors, the deviation of information transmission between the various subjects in the supply chain, and the impact of other sudden environmental factors, make a variety of inevitable food supply chain risks. It can be seen that strengthening the research on food supply chain risk management, detailing the

causes of risks, and formulating targeted risk prevention and control measures will contribute to the improvement of food safety.

## 2. Literature Review

Into the 21st century, domestic and foreign experts, scholars, industry organizations, food companies have significantly increased the research on food supply chain risk management. Their research methods, perspectives and conclusions are not the same. The summary is summarized as follows.

### 2.1. Food Supply Chain Risk Factors

For the domestic literature on supply chain risk research, most experts and scholars focus on the classification of supply chain risk factors from different perspectives, in order to have a holistic and clear understanding of supply chain risks. For example, Xiaoying Li (2003) studied the food supply chain risk from the three aspects of food supply chain management mode, system structure and operation mechanism, and considered that there are market risk, information risk and system risk in food supply chain management [1]. Xianing Dang (2003) divided the food supply chain risks into information risk, capital risk and efficiency risk according to

the reasons of food supply chain risk formation [2]. Kai Wang (2006) starting from the identification of risk factors in food supply chain risk management, and through the corresponding evaluation model, concluded that there are many raw material risks, organizational risks, natural risks, decision-making risks, etc. in the food supply chain [3]. In addition, Xiaolin Chen and Junwen Feng (2007) analyzed the status quo and characteristics of China's food supply chain and considered that the potential risks in China's food supply chain are: quality and safety risks, organizational management risks, informational risks, and natural risks such as disaster risks [4]. Bo Yang (2008) based on the reality of China's food industry, summed up the three risks that are common in China's food supply chain: quality risk, market risk, logistics and inventory control risk [5].

Foreign scholars have similar situations in the study of supply chain risks. For example, Ernst & Young (2003), after in-depth market research, believes that there are mainly supply chain management risks, inter-enterprise cooperation relationship risks, information symmetry risks, labor risks, and enterprise management risks [6]. Zsidisin (2005) through the research on the concept of food supply chain risk, concluded that the main risks in the food supply chain are: quality risk, supplier selection risk, production technology change risk and various natural disaster risks [7]. Bailey (2006) based on the overall situation of the food supply chain, divided the food supply chain risk into three categories: business operation risk, market environmental risk and natural disaster risk, and even subdivided them into multiple risks [8]. Others, such as Cranfield (2003), divided food supply chain risks into operational process risks, production process control risks, demand change risks, and environmental risks, etc [9].

### **2.2. Risk Control in the Food Supply Chain**

Risk control is another major area of food supply chain risk management research. But most of the research orientation is limited to a certain kind of supply chain risk and how to control it from a certain aspect. For example, Huafei Shi (2003) gave a theoretical solution to the moral hazard of food supply chain balance according to different preferences of consumers, and used game theory to explain the causes and countermeasures of the bullwhip effect [10]. Huatao Peng and Kefan Xie (2004) explored the role of information search in food supply chain management, the risk income of search information, and the response to information risks by establishing an information search model [11]. Junjun Dai and Zhong Ning (2005) analyzed the optimal supply strategy of distributors and the optimal production plan of suppliers by establishing a supply chain model of single suppliers and multiple distributors, and pointed out that strengthen information sharing and communication among enterprises can effectively improve the efficiency of the overall operation of the food supply chain and avoid cooperation separation as a risk [12]. Jinhai Yang (2007) proposed a countermeasure to control the risk of food supply chain from the perspective of government regulation of the food industry. He believed that government departments fundamentally reducing the risk of

food supply chain, must constantly improve the laws and regulations on food safety, effectively strengthen the government's supervision and crack down on illegal operations of food companies [13]. Petit (2007) believed that the establishment of a traceability system not only facilitates the identification of responsible persons in the event of a food safety incident, but also strengthens the quality control of food, avoids food quality risks, and establishes a good market image of the company [14].

In summary, the existing research on the risk factors of food supply chain and the research on risk control have their own research methods and focusing areas. However, most of the research on food supply chain risks is only listed risk factors as possible, as to how to effectively identify these factors, did not form theoretical results, and lack of systemic.

## **3. The Risk Management of Food Supply Chain**

### **3.1. Risk Management**

The risk exists objectively and does not change with the will of the human being. It exists along with the development of human activities. There is no human participation in an activity, and there is no risk. The results of risk are uncertain, divided into positive and negative effects. From an economic point of view, the former is called income and the latter is called loss.

Youjie Lu believes that risk refers to the deviation between the actual value generated by an event and the expected value, resulting in a loss that can be expressed as a decrease in the actual value or as an opportunity loss. The deviation or the difference occurs randomly with a certain probability, not judged in advance.

Risk has the characteristics of objectivity, universality, and contingency. For modern enterprises, risk management is the process to balance the cost of the investment to reduce the risk and the loss of the risk occurs, and decide whether to take measures to lower the risk, instead of reducing the probability of the risk to zero. Because the cost of the company's response to zero risk will be greater than the loss of the risk occurs. Effective risk management is to use the least resources to resolve the biggest crisis as much as possible to obtain the economic security of enterprise safety production.

### **3.2. Food Supply Chain Risk Management**

The food supply chain is a chain or network structure composed of many enterprises, organizations and individuals. As an integral part of the entire supply chain, the enterprise will be affected by the entire supply chain. In turn, the behavior of the enterprise also affects the entire supply chain. The risk of food supply chain is not limited to a certain enterprise or department, but every link in the supply chain. Due to the risk of each link may spread up and down, the balance of the entire supply chain is broken, and the overall cost of the supply chain increases. The decline in the market

share of core enterprises is more likely to directly lead to the collapse of the entire supply chain. For this reason, people's attention to food supply chain risk management is also increasing.

Food supply chain risk management refers to the analysis of the causes of risk occurs under the guidance of risk awareness, and adopts countermeasures to eliminate the factors, and to consolidate the trust relationship among members of the supply chain and reduce the occur of supply chain risks as a whole by strengthening an optimized organizational structure assistance of inter-enterprise strategies and technologies in the food supply chain. Its goal is to ensure the quality of food and maximize the overall profit of the supply chain. Food supply chain risk management is similar to the general risk management process. Only when the risks are clearly understood and the causes of the risks are known can the risks be targeted and prevented.

## 4. Identification of Supply Chain Risk Factors

### 4.1. Risk Factor Identification Principle

In order to truly and comprehensively reflect the risk factors and their manifestations of the food supply chain, this paper explores the main risk factors that may exist in the food supply chain based on the following principles.

#### (1) Objectivity

The objective nature of the supply chain, such as the natural attributes of food, the complexity of the food supply chain itself, and the uncertainty of the internal and external environment, may lead to food supply chain risks. Therefore, the identification of risk factors can only be based on the objective principle and the identified risk factors can be truly linked with the actual status of the food supply chain and reflect the objective actual situation.

#### (2) Significance

Regardless of the nature of the food supply chain or the complexity of the food industry, factors associated with the food supply chain can lead to risks and affect the normal operation of the supply chain. However, some factors have negligible impact on the supply chain, and some factors can have a devastating impact. Therefore, the identification of risk factors should distinguish between primary and secondary, looking for key factors.

#### (3) Systematic

Every aspect of the food supply chain has the possibility of risk. When considering risk factors, it should not be limited to only one point, but should be considered from the perspective of the overall interests of the food supply chain, including raw material suppliers, production processors, wholesale retailers and consumers. They may face common risks.

#### (4) Continuity

The food supply chain will undergo unexpected changes with the surrounding environment and its own operating conditions. The manifestation and presentation state of different risks in their different periods are different. Risks that

are negligible in some links may have a huge impact in other different links. The risk factors that have now a major impact will gradually disappear as the supply chain structure continues to improve, but new risk factors may appear. This means that the risk factors are constantly changing and have a certain continuity.

### 4.2. Risk Factors Identification

As the food industry becomes more international, diversified and refined, the food supply chain is becoming more complex. Risk factors are diversifying and the probability of occurrence is rising. Based on the current situation of food supply chain risk in China, according to the principle of objectivity, significance, system and continuity, there are five main risk factors in China's food supply chain, namely quality risk, market risk, logistics risk, cooperation risk and environment risk.

#### (1) Quality risk

The quality risk of the food supply chain, which comes from the nature of the food itself and the complexity of the supply chain system, can occur at every node of the food supply chain. The food production and storage environment is susceptible to natural conditions. The food production is seasonal and regional. Food consumers have their own preferences and dispersion.

The quality risk of the food supply chain is a hazard to the appearance and intrinsic quality of the food, which can cause and endanger the normal operation of the entire supply chain. From the perspective of system theory, we can conclude that there are quality risks in every link of the food supply chain from the supply of raw materials to the arrival of finished products. In the supply and wholesale links, most of the raw materials for food come from agricultural products. If there is a problem with the quality of raw materials, the products produced in the downstream processing are also problematic. If the foods in question reach the consumers, the interests of the whole food supply chain are undermined. In the food processing sector, these factors such as the abuse of additives and preservatives, using of unqualified packaging materials, outdated and no meet health standards production and processing equipment, may lead to quality risks. In the distribution process, the product has a wide market area, which makes the distribution distance long and many links. Some foods are subject to temperature and humidity factors and deteriorate due to their own or packaging reasons. For upstream raw material suppliers and product processing companies, the risk of this link is not significant, but it is fatal to downstream wholesalers and retailers. In sales links, sales channels are diverse and many retailers do not have good inventory conditions and sanitary conditions, which have left hidden dangers in the quality of sales.

It can be seen that the quality risk of the food supply chain may occur in every link. Although the impacts caused by different links are different, from the perspective of the overall supply chain, problems in each link will lead to the decline of the entire supply chain interests.

#### (2) Market risk

Market risk refers to uncertainties such as changes in product demand, market price, and changes in economic policies, which lead to derailment of producers or enterprises' production plans and market conditions, resulting in economic losses and waste of resources. The supply chain is a capital chain, and the source of funds is the market. Funds flow from the market to each node, and only if they gain benefits, the entire supply chain can operate normally. But changes in market demand are related to the price of food, the level of income of consumers, the regional distribution of consumers, the preferences of consumers, and the number of alternatives. Uncertainty in market demand makes it difficult for companies in the supply chain to judge whether the product conforms to the general rules of the market and to develop a production plan that is consistent with it. These increasing the operational risk of the entire supply chain. The "bullwhip effect" in the food supply chain is very prominent. The market demand information of foods is amplified from downstream consumers to upstream suppliers, which easily leads to the imbalance of supply and demand in the food supply chain, lower the overall operating costs and efficiency of the supply chain.

### (3) Logistics risk

The logistics risk of food supply chain refers to the problems arising from loading, transportation, packaging and handling, storage and preservation that food starts from the transportation of raw materials, to the finished product being delivered to the hands of consumers. In the process of circulation of materials in the supply chain, food materials have deteriorated or are subject to external pollution, which ultimately leads to the inability of companies to deliver on time and in quantity, breaking the balance and stability of the supply chain. At the same time, it may also affect the quality of products and threaten people's lives.

Most of the raw materials for food production are fresh agricultural and sideline products, which are generally seasonal and prone to deterioration. Improper product logistics and transportation methods will affect whether the products can be delivered to the production workshop on time and in quality. Semi-finished products after production and processing usually require a certain degree of preservation, which requires enterprises to have relatively good storage facilities. It can be seen that the occurrence of logistics risks is objective, which in turn leads to the destruction of the stability of the downstream food supply chain.

In recent years, China's food logistics has developed rapidly. Various base-type logistics centers have emerged all over the country. However, due to its started late, there are some questions such as insufficient organization and standardized management, the big gaps of the cold chain structure and equipment compared with developed countries. Enterprises generally have backward warehousing insurance technology, and the degree of informatization and mechanization is not high. The operations of sorting, packaging and handling are mainly manual. All these undoubtedly increases the risk of food deterioration and pollution.

### (4) Risk of cooperation

The risk of cooperation refers to the risks caused by the cooperation between the enterprises on the chain, including mistrust between enterprises, insufficient support, and the inability of a certain node to meet the requirements of the partners. A food supply chain without cooperation will greatly reduce its operational efficiency, lack competitiveness in the market, and ultimately affect its own interests. Because the nodes in the food supply chain have different functional divisions, only the enterprises and organizations in the chain work closely together and trust, the entire food supply chain system becomes a stable and coordinated whole, which can greatly enhance the competitiveness of the entire supply chain and make each subject in the entire supply chain more profitable.

The overall interest of the food supply chain is limited, and the interests of the members of the chain are mutually influential. Once the irrational distribution of benefits occurs, the enterprise may think that its own interests are damaged, and there is no cooperation or negative cooperation behavior, the balance of the supply chain is broken. Efficient operation of the food supply chain relies on frank and unreserved cooperation between supply chain partners. If the trust between supply chain cooperative enterprises is not high, it may lead to conservative cooperative behavior and asymmetric information exchange, which causing raw materials or semi-finished products to cut corners, upstream enterprises deliberately delaying delivery time, and pursuing pure interest relations among them. All lead to the risk of food supply chain cooperation. Similarly, the food supply chain as a whole, the high or low management capacity of its partners not only affects its own survival and development, but also affects the operation of the chain partners, which in turn affects the operational efficiency of the entire supply chain.

### (5) Environmental risks

Environmental risk refers to the direct or indirect damage to the food supply chain caused by environmental factors, resulting in interruption or delay of the supply chain and loss of the original balance and stability. Environmental risks mainly include natural environmental risks and social environmental risks.

Natural environmental risks can lead to disruptions in the supply chain and can also devastating the entire supply chain. For example, the raw materials of food mainly come from agricultural products. The climate disaster causes the crops to be reduced or never produced, declining quality of agricultural products. The purchase price, quantity and quality of food raw materials are affected, which in turn affects the price, quantity and quality of the whole food supply chain products. Abnormal or excessive temperature and humidity will shorten the shelf life of food, especially for foods with high freshness requirements. Rain and snow, freezing weather and typhoon and rain will have a serious impact on food transportation. Delay or cancellation of product transportation breaks the balance between supply and demand of existing food supply and affects product prices. Different weather and natural disasters will lead to a sharp rise in the sales of certain foods, and the shortage of supply will break the original balance of

the food supply chain etc.

Any food supply chain is linked to a specific socio-economic structure, industrial structure and legal environment. With the transformation and progress of society, its economic structure, industrial structure and legal environment will also change accordingly, forming social environmental risks that affect the stability of the food supply chain.

## 5. The Risk Control of the Food Supply Chain

### 5.1. Control of Quality Risks

#### (1) Control measures for quality risks

Quality risk can occur at every stage of the food supply chain. Therefore, quality risk control must be global and requires the joint efforts of supply chain members. Establishing a traceability system throughout the food supply chain is the current international practice for controlling food quality and safety. That is, using the EDI information platform to monitor the quality and safety of food. Tracing back from the downstream of the food supply chain when consumers have food quality and safety problems after eating the product, they can track up and find out the origin of the quality problem; or track from the upstream of the food supply chain to the downstream, from the agricultural production sites, food raw material suppliers, transporters, production and processing enterprises, wholesalers, distributors, retail outlets, the quality of raw materials, semi-finished products and finished products is monitored in real time.

The establishment of the traceability platform can significantly enhance the security and stability of the entire supply chain. Even if product quality problems occur in the intermediate links, the causes can be found in time to avoid further losses. The key to the function of the traceable information platform is that all members of the food supply chain must make sure that the input information is true, reliable, timely and effective.

#### (2) The company develops an emergency plan

Food safety problems caused by food quality problems often cause high concern from government departments and the public. As the core of the food supply chain, food processing enterprises should make emergency plans for sudden food problems in advance, and clearly define the principles and principles for handling problems. Once the quality problems of products occur, enterprises can timely respond to the consequences of risks according to the prepared plans such as actively taking remedial measures and conduct investigations on the causes of problems, holding press conferences, reporting the events and the latest findings of the incidents in real time, and having information sharing with consumers or the media. If it is indeed a business issue, the company must be brave enough to take responsibility and deal with the problem in a responsible attitude towards consumers. This will not only help the company deal with the problem before the crisis expands, but also regain the trust of

consumers.

### 5.2. Control of Market Risk

There are many reasons for the market demand risk. Different regions, different seasons, consumer preferences, industry macroeconomic policies and sudden food safety incidents will lead to strong changes in food market demand. In order to effectively deal with the market risk of the food supply chain, enterprises in the food supply chain should strengthen information sharing, and at the same time, formulate corresponding countermeasures for potential problems faced by them.

#### (1) Strengthen information sharing among enterprises

Strengthening information sharing among members of the food supply chain will not only help to identify potential market risks in a timely manner, but also take measures to remedy or evade at the first time, reduce corporate losses, and enhance trust and support among partners. Downstream of the food supply chain are a wide range of wholesalers and retailers who are able to understand the changes in product market demand information in the food supply chain. In the process of information dissemination along the supply chain, the sharing of information between the various entities in the chain plays an important role in the prevention of market risks. All parties involved in the supply chain should share product quality information truthfully, which is beneficial to different nodes to take different countermeasures, and can minimize losses in the event of sudden market risks. At the same time, strengthening information sharing can effectively reduce the impact of the "bullwhip effect" on the food supply chain, and can maintain the stable and efficient operation of the supply chain.

#### (2) The main body of the food supply chain strengthens the flexibility of production

The distributors downstream of the supply chain should formulate different sales plan according to the market's sales situation, seasonal changes, and people's consumption habits in different regions, timely adjust the purchasing volume, avoid serious inventory backlog, and have the obligation to promptly feeding back market demand information to upstream production companies, achieving information sharing. Food processing and production enterprises at the middle of the supply chain should conduct in-depth market research and market risk assessment and forecasting, and formulate more reasonable flexible production plans. When the market is sluggish, the production capacity will be reduced in time, and when the market demand is strong, the output will be increased. Many farmers or organizations located in the upstream of the food supply chain should always pay attention to market information from the internet and newspapers, and be able to adjust their production schedules in a timely manner. At the same time, they are actively looking for different suppliers to cooperate with them to spread market risks.

### 5.3. Control of Logistics Risks

#### (1) Cooperate to build food safety logistics

Fast and safe logistics in the food supply chain means that

enterprises can strengthen human and material resources input according to the actual requirements of the products in the process of product transportation and circulation, improve the scientific and technological content of transportation and storage equipment for refrigeration and preservation, and regulate loading, unloading and handling operation through mutual cooperation. The operations would make the logistics of raw materials or foods fast and safe. In the process of processing, transportation and storage of food, its product quality being ensured is the most basic requirement, but it is also a problem-prone link. The rapid and safe logistics of the food supply chain can enable the rapid and safe circulation of perishable and fresh food raw materials from production to processing, prevent the food contamination problems caused by temperature change the preservation of products, transportation, packaging and storage equipment due to temperature during the circulation process. Equipment and other problems caused by food contamination.

#### (2) Develop a new fast delivery strategy

The traditional product distribution scheme is to concentrate the food in one or more distribution centers before performing a unified delivery operation. The advantage of this distribution scheme is that it can effectively balance the relationship between supply and demand, and the utilization efficiency of transportation tools will also be improved. However, the negative factors brought about by it are also obvious, which prolongs the time of product distribution. More seriously, it needs to establish a distribution center, which increases the operating cost and inventory management cost of the enterprise.

Compared with the traditional distribution strategy, the new direct transportation and direct transportation have the advantages of quick response to market changes and flexibility. There is no intermediate link in direct transportation. Raw materials or products are not deployed through warehouses and distribution centers, directly from the place of production to the processing plant to the consumer, or directly from the place of origin to the consumer. The use of this distribution method can effectively reduce the deterioration rate of the product, especially for perishable foods.

### 5.4. Control of Cooperation Risks

#### (1) Improve the interest distribution mechanism

The food supply chain system works properly because members of the chain are all for a common goal: maximizing benefits. One of the main reasons for the risk of cooperation is the uneven distribution of benefits. It is also an important factor that threatens the quality and safety of food. Therefore, establishing a sound interest distribution mechanism and striving to promote the balance of interests among the enterprises on the chain will not only improve the cooperation enthusiasm among the members of the chain, but also promote the smooth implementation of the quality and safety management of the food supply chain.

In the food supply chain, core companies have core resources throughout the supply chain and have an absolute initiative in the distribution of benefits. Although the core

enterprises have the initiative to distribute the benefits, the interests of the supply chain as a whole should be considered when they establish the perfect distribution mechanism. The vital interests of the various entities within the supply chain should be taken into account, and all members should be considered as a community of glory and common interests.

#### (2) Improve the constraint mechanism

Since the members of the supply chain are not subordinate, it is not possible to use administrative orders to determine the behavior of the partners. Only the contractual agreements can be used to constrain the behavior of the partners, and efforts are made to win the support of the partners so that they become a real community of interests. The partners in the food supply chain should sign a legally binding contract agreement on the premise of voluntariness, equality and mutual benefit, and clarify their respective responsibilities and powers. The sincere and close cooperation between the various subjects in the supply chain is the first step to ensure the quality and safety of food.

#### (3) Strengthen the construction of the supply chain system

##### 1) Highlight the coordination role of core enterprises

There are a number of core companies in the supply chain that play a key role in the quality of the final product. They play a leading role throughout the supply chain. Whether the supply chain operates efficiently depends on the overall coordination capabilities of the core companies. The coordination ability of the core enterprises is firstly reflected in establishing the vision and values shared by the members of the food supply chain. The core companies advocate the concept and values of the importance of food quality and safety throughout the supply chain, and lead the member companies to work hard for the overall benefit of the supply chain. Secondly, their coordination ability is reflected in establishing an information exchange platform. All member companies will be included in the information control platform to achieve high transparency among members and real-time sharing of information.

##### 2) Optimize the choice of partners

The operation of the food supply chain is a process of collaboration among members. Each node may have a fatal blow to food quality and safety. Choosing a trusted partner will have a multiplier effect on risk control. According to the research on the companies, when selecting partners, they should fully investigate their reputation, equipment management, quality control, cost control, technology development, user satisfaction, delivery agreement or order agreement, which is likely to become a factor of impacting the supply chain safety.

### 5.5. Control of Environmental Risks

The food supply chain is obviously affected by natural environmental factors and does not change with the will of the human being. It can only rely on the members of the chain to constantly pay attention to changes in the external environment, and formulate environmental emergency plans in advance so that taking timely action when risk occurs. For the food supply chain risks brought about by changes in social

environmental factors, enterprises on the chain should respond by building their own capabilities. By enhancing technological innovation, self-learning ability and social responsibility, building a learning organization and using new knowledge and new technologies to continuously improve the levels of the companies, the food supply chain can continuously meet the requirements of the new era and enhance the risk resistance ability.

## 6. Conclusion

Food supply chain risk management research is still in its infancy compared to other industries. The food supply chain is more fragile and complex than the supply chain of other industries because of its special attributes. In order to improve the income of various entities in the food supply chain, the risk management of its supply chain must proceed from the whole, and the quality risk, market risk, logistics risk, cooperation risk and environmental risk in the supply chain should be fully identified, comprehensive analysis, and take targeted measures to prevent them, in order to effectively reduce and eliminate risks.

Food supply chain risk control is a complex system engineering. It requires the three parties involved in the food safety supervision system, including the regulators, the regulated parties and the consumers, are jointly constructed, and the three-pronged approach can make a difference. Different food supply chain risks have different risk control strategies, but a complete food information traceability system, a rapid response information platform for responding to food safety incidents, and cooperation among stakeholders in the supply chain are indispensable safeguards. Rapid integration and rapid sharing of food safety information across its entire supply chain minimizes the social hazards of food safety issues.

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## Biography



**Haishui Jin** (1968—). He is working at Beijing Wuzi University. In 2010-2011, as a visiting scholar, he went to Michigan State University to do some research works. In 2014, he went to the University of Illinois as a senior visiting scholar for doing supply chain management research. Now he mainly engaged in food quality and safety information transmission, food quality information traceability, food supply chain risk management and other aspects of research, has published more than 40 academic papers on supply chain management.